

No. 24-1097

IN THE
United States Court of Appeals for the Federal Circuit

GOOGLE LLC,

Plaintiff-Appellee,

v.

SONOS, INC.,

Defendant-Appellant.

On Appeal from the United States District Court for the
Northern District of California
Nos. 3:22-cv-06754-WHA and 3:21-cv-07559-WHA, Hon. William Alsup

OPENING BRIEF OF APPELLANT SONOS, INC.

George I. Lee

Sean M. Sullivan

Rory P. Shea

J. Dan Smith

Cole B. Richter

LEE SULLIVAN SHEA & SMITH LLP

656 W. Randolph St., Floor 5W

Chicago, IL 60661

Clement S. Roberts

Elizabeth R. Moulton

Sachi Schuricht

ORRICK, HERRINGTON &

SUTCLIFFE LLP

405 Howard Street

San Francisco, CA 94105

E. Joshua Rosenkranz

Joseph R. Kolker

ORRICK, HERRINGTON &

SUTCLIFFE LLP

51 West 52nd Street

New York, NY 10019

(212) 506-5000

Alyssa Caridis

Nicholas González

ORRICK, HERRINGTON &

SUTCLIFFE LLP

355 S. Grand Avenue, Suite 2700

Los Angeles, CA 90071

Lauren A. Weber

ORRICK, HERRINGTON &

SUTCLIFFE LLP

401 Union Street, Suite 3300

Seattle, WA 98101

Counsel for Appellant

CLAIM LANGUAGE AT ISSUE

U.S. Patent No. 10,848,885: Claim 1

1. A first zone player comprising:

a network interface that is configured to communicatively couple the first zone player to at least one data network;

one or more processors;

a non-transitory computer-readable medium; and

program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

while operating in a standalone mode in which the first zone player is configured to play back media individually in a networked media playback system comprising the first zone player and at least two other zone players:

(i) receiving, from a network device over a data network, a first indication that the first zone player has been added to a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked; and

(ii) receiving, from the network device over the data network, a second indication that the first zone player has been added to a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the second zone player is different than the third zone player;

after receiving the first and second indications, continuing to operate in the standalone mode until a given one of the first and second zone scenes has been selected for invocation;

after the given one of the first and second zone scenes has been selected for invocation, receiving, from the network device over the data network, an instruction to operate in accordance with a given one of the first and second zone scenes respectively comprising a given one of the first and second predefined groupings of zone players; and

based on the instruction, transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players such that the first zone player is configured to coordinate with at least one other zone player in the given one of the first and second predefined groupings of zone players over a data network in order to output media in synchrony with output of media by the at least one other zone player in the given one of the first and second predefined groupings of zone players.

U.S. Patent No. 10,469,966: Claim 1

1. A computing device comprising:

one or more processors;

a non-transitory computer-readable medium;

and program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

while serving as a controller for a networked media playback system comprising a first zone player and at least two other zone players, wherein the first zone player is operating in a standalone mode in which the first zone player is configured to play back media individually:

receiving a first request to create a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked;

based on the first request, i) causing creation of the first zone scene, ii) causing an indication of the first zone scene to be transmitted to the first zone player, and iii) causing storage of the first zone scene;

receiving a second request to create a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the third zone player is different than the second zone player;

based on the second request, i) causing creation of the second zone scene, ii) causing an indication of the second zone scene to be transmitted to the first zone player, and iii) causing storage of the second zone scene; displaying a representation of the first zone scene and a representation of the second zone scene; and while displaying the representation of the first zone scene and the representation of the second zone scene, receiving a third request to invoke the first zone scene; and

based on the third request, causing the first zone player to transition from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

U.S. Patent No. 10,779,033: Claim 1

1. A computing device comprising:

at least one processor;

a non-transitory computer-readable medium; and

program instructions stored on the non-transitory computer-readable medium that, when executed by the at least one processor, cause the computing device to perform functions comprising:

operating in a first mode in which the computing device is configured for playback of a remote playback queue provided by a cloud-based computing system associated with a cloud-based media service;

while operating in the first mode, displaying a representation of one or more playback devices in a media playback system that are each i) communicatively coupled to the computing device over a data network and ii) available to accept playback responsibility for the remote playback queue;

while displaying the representation of the one or more playback devices, receiving user input indicating a selection of at least one given playback device from the one or more playback devices;

based on receiving the user input, transmitting an instruction for the at least one given playback device to take over responsibility for playback of the remote playback queue from the computing device, wherein the instruction configures the at least one given playback device to (i) communicate with the cloud-based computing system in order to obtain data identifying a next one or more media items that are in the remote playback queue, (ii) use the obtained data to retrieve at least one media item in the

remote playback queue from the cloud-based media service;
and (iii) play back the retrieved at least one media item;

detecting an indication that playback responsibility for the
remote playback queue has been successfully transferred
from the computing device to the at least one given playback
device; and

after detecting the indication, transitioning from i) the first
mode in which the computing device is configured for
playback of the remote playback queue to ii) a second mode
in which the computing device is configured to control the at
least one given playback device's playback of the remote
playback queue and the computing device is no longer
configured for playback of the remote playback queue.

U.S. Patent No. 9,967,615: Claim 13

13. A tangible, non-transitory computer readable storage medium
including instructions for execution by a processor, the instructions,
when executed, cause a control device to implement a method
comprising:

causing a graphical interface to display a control interface
including one or more transport controls to control playback by the
control device;

after connecting to a local area network via a network interface,
identifying playback devices connected to the local area network;

causing the graphical interface to display a selectable option for
transferring playback from the control device;

detecting a set of inputs to transfer playback from the control
device to a particular playback device, wherein the set of inputs
comprises: (i) a selection of the selectable option for transferring
playback from the control device and (ii) a selection of the
particular playback device from the identified playback devices
connected to the local area network;

after detecting the set of inputs to transfer playback from the control device to the particular playback device, causing playback to be transferred from the control device to the particular playback device, wherein transferring playback from the control device to the particular playback device comprises:

- (a) causing one or more first cloud servers to add multimedia content to a local playback queue on the particular playback device, wherein adding the multimedia content to the local playback queue comprises the one or more first cloud servers adding, to the local playback queue, one or more resource locators corresponding to respective locations of the multimedia content at one or more second cloud servers of a streaming content service;
- (b) causing playback at the control device to be stopped; and
- (c) modifying the one or more transport controls of the control interface to control playback by the playback device; and

causing the particular playback device to play back the multimedia content, wherein the particular playback device playing back the multimedia content comprises the particular playback device retrieving the multimedia content from one or more second cloud servers of a streaming content service and playing back the retrieved multimedia content.

FORM 9. Certificate of Interest

Form 9 (p. 1)
March 2023

**UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT**

CERTIFICATE OF INTEREST

Case Number 24-1097

Short Case Caption Google LLC v. Sonos, Inc.

Filing Party/Entity Sonos, Inc.

Instructions:

1. Complete each section of the form and select none or N/A if appropriate.
2. Please enter only one item per box; attach additional pages as needed, and check the box to indicate such pages are attached.
3. In answering Sections 2 and 3, be specific as to which represented entities the answers apply; lack of specificity may result in non-compliance.
4. Please do not duplicate entries within Section 5.
5. Counsel must file an amended Certificate of Interest within seven days after any information on this form changes. Fed. Cir. R. 47.4(c).

I certify the following information and any attached sheets are accurate and complete to the best of my knowledge.

Date: 02/12/2024

Signature: /s/ E. Joshua Rosenkranz

Name: E. Joshua Rosenkranz

FORM 9. Certificate of Interest

Form 9 (p. 2)
March 2023

1. Represented Entities. Fed. Cir. R. 47.4(a)(1).	2. Real Party in Interest. Fed. Cir. R. 47.4(a)(2).	3. Parent Corporations and Stockholders. Fed. Cir. R. 47.4(a)(3).
Provide the full names of all entities represented by undersigned counsel in this case.	Provide the full names of all real parties in interest for the entities. Do not list the real parties if they are the same as the entities. <input checked="" type="checkbox"/> None/Not Applicable	Provide the full names of all parent corporations for the entities and all publicly held companies that own 10% or more stock in the entities. <input type="checkbox"/> None/Not Applicable
Sonos, Inc.		BlackRock Inc.

☐ Additional pages attached

FORM 9. Certificate of Interest

Form 9 (p. 3)
March 2023

4. Legal Representatives. List all law firms, partners, and associates that (a) appeared for the entities in the originating court or agency or (b) are expected to appear in this court for the entities. Do not include those who have already entered an appearance in this court. Fed. Cir. R. 47.4(a)(4).

☐ None/Not Applicable ☒ Additional pages attached

See attached		

5. Related Cases. Other than the originating case(s) for this case, are there related or prior cases that meet the criteria under Fed. Cir. R. 47.5(a)?

☒ Yes (file separate notice; see below) ☐ No ☐ N/A (amicus/movant)

If yes, concurrently file a separate Notice of Related Case Information that complies with Fed. Cir. R. 47.5(b). **Please do not duplicate information.** This separate Notice must only be filed with the first Certificate of Interest or, subsequently, if information changes during the pendency of the appeal. Fed. Cir. R. 47.5(b).

6. Organizational Victims and Bankruptcy Cases. Provide any information required under Fed. R. App. P. 26.1(b) (organizational victims in criminal cases) and 26.1(c) (bankruptcy case debtors and trustees). Fed. Cir. R. 47.4(a)(6).

☒ None/Not Applicable ☐ Additional pages attached

Attachment

4. Legal Representatives. List all law firms, partners, and associates that (a) appeared for the entities in the originating court or agency or (b) are expected to appear in this court for the entities. Do not include those who have already entered an appearance in this court. Fed. Cir. R. 47.4(a)(4).

Orrick, Herrington & Sutcliffe LLP: Bas de Blank, Shane D. Anderson, Evan D. Brewer

Lee Sullivan Shea & Smith LLP: David R. Grosby, Jae Y. Pak, Matthew J. Sampson, Michael P. Boyea

TABLE OF CONTENTS

	Page
CLAIM LANGUAGE AT ISSUE.....	i
CERTIFICATE OF INTEREST	vii
TABLE OF AUTHORITIES.....	xiii
STATEMENT OF RELATED CASES	xvii
INTRODUCTION.....	1
STATEMENT OF JURISDICTION.....	4
STATEMENT OF THE ISSUES.....	4
STATEMENT OF THE CASE	5
Sonos Brings Home-Audio Systems Into The Internet Era	5
Sonos Patents Its Revolutionary Technology	7
Google Launches A Music-Streaming Service And Then Releases A “Sonos Clone” Speaker	11
Sonos Sues Google, And The District Court Conducts A “Patent Showdown”	13
The District Court Invalidates The ’033 Patent Before Trial	17
The Jury Finds Infringement But The District Court Overrides The Jury’s Verdict.....	17
SUMMARY OF ARGUMENT	22
STANDARD OF REVIEW.....	25
ARGUMENT	26
I. The District Court Abused Its Discretion In Holding The Zone-Scene Patents Unenforceable Because Of Prosecution Laches.	26
A. Prosecution laches does not apply because Sonos did not extend the duration of its monopoly.....	27

B.	The district court erred in applying prosecution laches to standard continuation practice yielding no prejudice.	33
1.	Sonos did not unreasonably delay prosecution. .	33
2.	Google suffered no prejudice.....	41
II.	The District Court Erred In Granting JMOL On The Priority Date And Written Description Of The Zone-Scene Patents.	45
A.	Sonos disclosed overlapping zone scenes no later than 2007, even without the 2019 amendment.....	49
B.	Sonos did not add new matter to the zone-scene specification in 2019.....	58
C.	This Court should reverse outright, or at a minimum order a limited retrial based on a full evidentiary record.	68
III.	The District Court Improperly Resolved Disputed Facts In Invalidating The '615 And '033 Patents.....	71
A.	The district court improperly resolved a factual dispute over whether the prior art discloses a “device-picker.”	72
B.	The district court improperly resolved a factual dispute over whether the playlist stored on a server in the prior art is a “remote playback queue.”	76
CONCLUSION		80
ADDENDUM		
CERTIFICATE OF COMPLIANCE		

TABLE OF AUTHORITIES

	Page(s)
Cases	
<i>Adasa Inc. v. Avery Dennison Corp.</i> , 55 F.4th 900 (Fed. Cir. 2022).....	25
<i>Advanced Display Sys., Inc. v. Kent State Univ.</i> , 212 F.3d 1272 (Fed. Cir. 2000)	60
<i>Akamai Techs., Inc. v. Cable & Wireless Internet Servs., Inc.</i> , 344 F.3d 1186 (Fed. Cir. 2003)	32
<i>In re Bogese</i> , 303 F.3d 1362 (Fed. Cir. 2002)	28, 35
<i>In re Buszard</i> , 504 F.3d 1364 (Fed. Cir. 2007)	38
<i>Cancer Rsch. Tech. Ltd. v. Barr Lab’ys, Inc.</i> , 625 F.3d 724 (Fed. Cir. 2010)	33, 41
<i>Commonwealth Sci. & Indus. Rsch. Org. v. Buffalo Tech. (USA), Inc.</i> , 542 F.3d 1363 (Fed. Cir. 2008)	48, 60, 68, 69
<i>Crown Cork & Seal Co. v. Ferdinand Gutmann Co.</i> , 304 U.S. 159 (1938).....	28
<i>Crown Packaging Tech., Inc. v. Ball Metal Beverage Container Corp.</i> , 635 F.3d 1373 (Fed. Cir. 2011)	58
<i>Eli Lilly & Co. v. Hospira, Inc.</i> , 933 F.3d 1320 (Fed. Cir. 2019)	44, 45
<i>Gen. Talking Pictures Corp. v. W. Elec. Co.</i> , 304 U.S. 175 (1938).....	45

<i>Geo. M. Martin Co. v. All. Mach. Sys. Int’l LLC</i> , 618 F.3d 1294 (Fed. Cir. 2010)	25
<i>Hangarter v. Provident Life & Acc. Ins. Co.</i> , 373 F.3d 998 (9th Cir. 2004)	57
<i>Hyatt v. Hirshfeld</i> , 998 F.3d 1347 (Fed. Cir. 2021)	29, 30, 35, 37, 38
<i>i4i Ltd. P’ship v. Microsoft Corp.</i> , 598 F.3d 831 (Fed. Cir. 2010)	43
<i>Kingsdown Med. Consultants, Ltd. v. Hollister Inc.</i> , 863 F.2d 867 (Fed. Cir. 1988)	2, 32, 38
<i>Koito Mfg. Co. v. Turn-Key-Tech, LLC</i> , 381 F.3d 1142 (Fed. Cir. 2004)	48
<i>Liebel-Flarsheim Co. v. Medrad, Inc.</i> , 358 F.3d 898 (Fed. Cir. 2004)	32
<i>Med. Instrumentation & Diagnostics Corp. v. Elekta AB</i> , 344 F.3d 1205 (Fed. Cir. 2003)	76
<i>Microsoft Corp. v. i4i Ltd. P’ship</i> , 564 U.S. 91 (2011)	33
<i>Murphy v. City of Long Beach</i> , 914 F.2d 183 (9th Cir. 1990)	70
<i>Ortiz v. Jordan</i> , 562 U.S. 180 (2011)	70
<i>Paice LLC v. Ford Motor Co.</i> , 881 F.3d 894 (Fed. Cir. 2018)	49
<i>Personalized Media Commc’ns, LLC v. Apple Inc.</i> , 57 F.4th 1346 (Fed. Cir. 2023)	25, 29, 33, 35, 43
<i>Pozen Inc. v. Par Pharm., Inc.</i> , 696 F.3d 1151 (Fed. Cir. 2012)	50

<i>Rivera v. ITC</i> , 857 F.3d 1315 (Fed. Cir. 2017)	50, 68
<i>Santos-Arrieta v. Hosp. Del Maestro</i> , 14 F.4th 1 (1st Cir. 2021).....	70
<i>Symbol Techs., Inc. v. Lemelson Med., Educ. & Rsch. Found.</i> , 422 F.3d 1378 (Fed. Cir. 2005)	27, 29, 31, 35, 37, 41
<i>Therasense, Inc. v. Becton, Dickinson & Co.</i> , 649 F.3d 1276 (Fed. Cir. 2011)	33
<i>TriMed, Inc. v. Stryker Corp.</i> , 608 F.3d 1333 (Fed. Cir. 2010)	76, 79
<i>Webster Elec. Co. v. Splitdorf Elec. Co.</i> , 264 U.S. 463 (1924).....	27
<i>Woodbridge v. United States</i> , 263 U.S. 50 (1923).....	27, 28, 41

Statutes

28 U.S.C. § 1295	4
28 U.S.C. § 1338	4
28 U.S.C. § 1367	4
35 U.S.C. § 120	38, 49
35 U.S.C. § 132(a).....	60
35 U.S.C. § 282	33

Rules and Regulations

37 C.F.R. § 1.56	40
37 C.F.R. § 1.57(g)	60
Fed. R. Civ. P. 50.....	21, 24, 49

Fed. R. Civ. P. 50(a).....	48, 69
Fed. R. Civ. P. 50(a)(1)	69
Fed. R. Civ. P. 50(b).....	48, 69

Other Authorities

Comments of the Biotechnology Industry Organization on the USPTO’s Proposed Rule Changes, 25 Biotech. L. Report 473 (2006).....	38
Patent Reform Act of 2005, H.R. 2795, 109th Cong. § 8 (2008)	39
Patent Reform Act of 2005: Hearing Before the Subcomm. on Courts, the Internet, and Intellectual Property, 109 Cong. (2005).....	39
PatentsView, USPTO, Annualized Data Tables, http://tinyurl.com/3a32yrxp	39
U.S. Patent & Trademark Office, Manual of Patent Examining Procedure § 2163 (9th ed. 2023)	66

STATEMENT OF RELATED CASES

This appeal may affect or be affected by Sonos's pending appeal from the Patent Trial and Appeal Board's decision holding claims 1-2, 6-14, 18-25, and 27-29 of the '615 patent unpatentable. *See Sonos, Inc. v. Google LLC*, No. 23-2040.

Google filed a mandamus petition seeking to have Sonos's case transferred from the Western District of Texas to the Northern District of California; this Court granted the petition. *In re Google LLC*, No. 21-170 (Judges Lourie, Bryson, and Taranto, per curiam). Sonos sought interlocutory review of a decision dismissing Sonos's claims for willful and indirect infringement; this Court denied the petition. *Sonos, Inc. v. Google LLC*, Nos. 22-134, 22-144 (Judges Dyk, Reyna, and Chen, per curiam).

INTRODUCTION

The district court has strong views about “the way the patent system should work.” Appx21412. But those views conflict with the Patent Act, the Federal Rules of Civil Procedure, and this Court’s precedent. Undeterred, the district court rewrote patent law and reconstituted the judicial role to erase a \$32.5 million jury verdict and throw out other patent claims that should have been tried.

To override the jury verdict, the district court recast the doctrine of prosecution laches in an unprecedented way to declare two of Sonos’s patents unenforceable. The court recognized that Sonos prosecuted the patent family diligently through several continuation applications off a 2006 provisional application. The court also acknowledged that Sonos did nothing that extended its patents’ terms. Yet the court held that Sonos took too long to prosecute the specific claims it asserted against Google here.

The court was most troubled that Sonos added the asserted claims in a continuation application after Google brought its infringing products to market. But Sonos disclosed the invention years before Google even began investing in those products, and informed Google

about that patent family. In fact, Sonos had already secured patents in the same family with broader claims covering Google's products. At any rate, "amend[ing] [to] insert claims intended to cover a competitor's product" is not "in any manner improper"—and, in fact, is entirely compatible with Congress's design. *Kingsdown Med. Consultants, Ltd. v. Hollister Inc.*, 863 F.2d 867, 874 (Fed. Cir. 1988). If this Court condones this novel application of prosecution laches, it will endanger many thousands of patents secured through standard continuation practice and discourage the early and complete disclosure of new innovations.

The district court also found the asserted claims invalid on the ground that Sonos did not supply adequate written description as of the claimed priority date. The court had previously rejected Google's summary judgment motion on written description, and Google did not try that defense or a priority-date challenge to the jury. Yet the court took the reins of Google's defense and crafted a narrative of Sonos's subterfuge to justify its invalidity ruling.

The court hinted at this story for the first time in the middle of trial, but waited until after trial to recount it fully, depriving Sonos of

any opportunity to present testimony refuting it. The court found that written description for the asserted claims depended on a single sentence that Sonos added to the specification by amendment in 2019. It ignored that the specification contained additional support for the claims and the sentence in question had been incorporated by reference into every earlier application in the priority chain. Nevertheless, the court concluded that Sonos had tricked the Patent Office into allowing the amendment. That finding was inconsistent with the record evidence and depended on multiple disputed facts that would have been for jurors to decide—if anyone had ever presented the issues to them.

These intrusions into the jury's domain were not isolated to the two patents that went to trial. On two other patents, the district court granted Google summary judgment of invalidity. But it did so only by resolving factual disputes about the prior art.

This is not how Congress said the patent system should work, nor how the Federal Rules say the judicial system should work. This Court should reverse the post-trial laches and invalidity rulings on the '885 and '966 patents. And it should vacate the summary judgment rulings on the '615 and '033 patents to allow Sonos to try its case to a jury.

STATEMENT OF JURISDICTION

The district court had jurisdiction under 28 U.S.C. §§ 1338 and 1367. It entered final judgment on October 10, 2023, and amended the judgment on November 14, 2023. Appx106; Appx107-108. Sonos filed a notice of appeal on October 17, 2023, and an amended notice on November 15, 2023. Appx11489-11490; Appx11491-11492. This Court has jurisdiction under 28 U.S.C. § 1295.

STATEMENT OF THE ISSUES

1. Whether the district court erred in applying prosecution laches to declare the '885 and '966 patents unenforceable, based on nothing but standard continuation practice that did not extend the patents' terms.

2. Whether the district court erred in granting judgment as a matter of law on the written description and priority date of the '885 and '966 patents, where the limited evidence that the court considered established a priority date no later than 2007, Google forfeited the issues, and Sonos had no opportunity to present relevant evidence on these factual questions.

3. Whether the district court erred by granting summary judgment of invalidity for the '615 and '033 patents where Sonos raised

genuine disputes of material fact about whether the prior art rendered the patents obvious.

STATEMENT OF THE CASE

Sonos Brings Home-Audio Systems Into The Internet Era

Flash back to the turn of the century. Home-audio technology looked “almost nothing like what you see today.” Appx20253. Most homes had just “CD players or radios” that played in individual rooms. Appx20253. The rare multiroom systems were rigid and “low-tech.” Appx20253-20254. Installers had to “pull wires through the walls or ceiling, repair drywall, and patch things,” Appx20253-20254, and redo all the wiring to change the configuration. Wires connected each speaker to a central receiver that controlled the system. Appx20255-20256.

Sonos changed all of this. Appx20252-20253. Its founders envisioned “a new kind of home-audio system” built for “internet-based music services.” Appx20253. Sonos disrupted the status quo in several fundamental ways.

First, Sonos invented “intelligent network devices” called ZonePlayers that superseded the central receiver. These players would

go in each room of a house and “provide the music functionality for that particular room.” Appx20257. Unlike traditional speakers, ZonePlayers had processors, ran software, and connected to the internet and other devices on the network. Appx20263-20264. Relatedly, Sonos eliminated wires by using “network technology” and “internet-based music sources.” Appx20257. And Sonos ditched basic remote controls for a “smart controller that offered two-way communication” with the system. Appx20257.

When Sonos started this endeavor in the early 2000s, the necessary technology “was in its infancy.” Appx20258. Smartphones did not exist yet, there were no legitimate online music services, and “few people had [even] thought of connecting ... devices other than computers to the internet.” Appx20258; Appx20265; Appx20284. Sonos overcame those challenges through years of painstaking engineering and released its first commercial products—the ZP100 (an audio player that connected to external speakers) and CR100 (a hardware controller)—in 2005. Appx20274-20275.

Sonos’s controller allowed users to group ZP100s in different rooms of their house, such as the family room and the kitchen, to play

music in sync. Appx20268-20269; Appx20274-20275; Appx10763. And users could also dynamically change which rooms were part of a group whenever they wanted.

Industry experts lauded Sonos's system, calling it "easily the best music streaming product I have seen," and marveling that it could "play the same music throughout the house perfectly synchronized."

Appx20281-20284 (quoting Appx34462-34463; Appx34464). Sonos continued to innovate at a rapid pace, launching a range of top-quality speakers designed for wireless home audio and transforming its controller from hardware into a smartphone app. Appx20286-20287. Sonos released its first controller app for the iPhone in 2008 and its first fully wireless smart speaker in 2009. Appx20286-20287; Appx1315; *contra* Appx54 (erroneously stating that Sonos did not release its first "internet-connected smart speaker" until 2014).

Sonos Patents Its Revolutionary Technology

This appeal involves four Sonos patents: a pair of "zone scene" patents (U.S. Patent Nos. 10,848,885 and 10,469,966) and a pair of "direct control" patents (U.S. Patent Nos. 10,779,033 and 9,967,615).

'885 and '966 patents: The zone-scene patents share a specification and claim priority to a September 2006 provisional application. Appx2052; Appx347. The patents relate to creating and invoking “zone scenes”: predefined, saved groups of players, such as smart speakers, that can play synchronous audio. *E.g.*, Appx20287; Appx2089 2:36-45. The '885 patent covers zone scenes from the speaker's perspective, while the '966 patent covers them from the perspective of the controller (e.g., a smartphone). *E.g.*, Appx2094 11:36-40; Appx383 11:35-47.¹

The patents explain the problem that the zone-scene invention was designed to address. Before this invention, speaker groups were “dynamic.” Appx20287-20288. That meant a user would create an ad hoc group of speakers and invoke it immediately for synchronous playback, but the group was destroyed the moment the user chose to put one of the grouped speakers into a different group, or to play something individually on one of the previously grouped speakers. Appx20287-20288.

¹ While smart speakers are not the only type of “players” covered by Sonos's patents, for simplicity, this brief uses “speakers” to describe the broader category.

To address that problem, Sonos invented zone scenes. Zone scenes are predefined, saved groups of speakers that a user can invoke for synchronous playback whenever they want. Appx20288. For example, a user can create and save a “Morning” zone scene of speakers in her bedroom, kitchen, and bathroom, Appx20288, and also a partially overlapping “Downstairs” zone scene of all speakers on the first floor, including the kitchen, dining room, and family room, Appx20292-20293. The user can start the day with the Morning zone scene and then later seamlessly switch to Downstairs. But the switch does not destroy the Morning zone scene; the following morning, the user can revert to the Morning zone scene. The same speaker (here, the kitchen) can belong to multiple, coexisting zone scenes and thus “overlap.” Appx20289-20293. And the user can play music individually on any speaker without destroying either the Morning or Downstairs zone scenes. Appx20291-20293.

Zone scenes thus improve the user experience by making it possible to “instantly” and repeatedly invoke a previously saved group instead of “redoing that work again and again of selecting the particular players” for a dynamic group. Appx20291.

Sonos conceived of zone scenes by 2005. Appx10954. But for a variety of technical and market reasons, it did not incorporate them into its first generation of products. *See* Appx20915. Sonos instead spent its limited resources adapting to a litany of seismic developments in the industry, including “the rise of the smartphone” and the invention of “every single music service that you use today.” Appx20289-20291. Sonos overhauled its system hardware and software in 2020 to practice the zone-scene patents. Appx20287.

’033 and ’615 patents: The direct-control patents share a different specification. They relate to using a “control device” such as a smartphone to transfer playback responsibility to a “playback device,” such as a smart speaker, through an app like Spotify. *E.g.*, Appx282 2:10-19. Sonos calls this technology “direct control” because it allows a user to directly control a Sonos speaker or a group of speakers—by selecting a song, changing the volume, and so forth—through a third-party app.

The direct-control and zone-scene technologies complement each other. For example, with direct control, a user can select a saved group through her third-party music app and play music to all of her

“Downstairs” speakers in sync, without needing to open the separate Sonos app. Appx20293-20294. Third-party streaming apps typically lack the capability to select multiple speakers at a time for playback, so Sonos’s inventions provide a crucial bridge for users to have a seamless streaming experience. Appx20293-20294.

Google Launches A Music-Streaming Service And Then Releases A “Sonos Clone” Speaker

From its inception, Sonos “kept in touch” with companies that were developing online music services “with an eye towards making the[ir] content ... available for playback on Sonos.” Appx20299. So, when Google launched its streaming service, Google Play Music, in 2013, Sonos welcomed the opportunity to collaborate toward integrating Google Play Music with Sonos. Appx20299-20302; Appx1605. At the time, Google and Sonos did not compete: Google offered no speaker hardware, and Sonos did not offer its own streaming content. Appx20307.

From 2013 to 2015, Sonos and Google discussed a potential collaboration to make Google’s music service compatible with Sonos’s speakers. In the summer of 2013, Sonos gave Google a “detailed explanation” of how its products functioned. Appx20302-20304. Sonos

also shared physical Sonos devices and the “Sonos music API” that enabled third-party services to work with Sonos. Appx20304-20305; *see* Appx1613-1615 (emails between Sonos and Google). The parties met again in 2014 to explore integrating Sonos with Google’s “Cast for Audio” technology, which lets users send and control content such as songs and videos from smaller computing devices (phones and tablets) to larger devices like speakers or TVs. Appx9651 (played at Appx20650); Appx34432-34456 (Cast for Audio presentation).

What Google did not share was that it was plotting to release hardware that competed directly with Sonos. Google released its first competing products in December 2015—six years after Sonos released its first smart speaker—and has continued launching more ever since. Appx20307-20311. The press called Google’s speakers “Sonos [c]lone[s].” Appx1370. Google also released apps for controlling the hardware—including creating and saving speaker groups. Appx4551-4552.

Sonos repeatedly warned Google that it infringed Sonos’s patents, including patents in the zone-scene and direct-control families. *See* Appx7579. Sonos spent years trying to persuade Google to take a

license. Appx7489-7491. But Google’s infringement continued unabated, and with the press reporting that Google’s new products brought Google “one step closer to replacing your Sonos system,” Sonos had no choice but to sue. Appx15454-15460.

Sonos Sues Google, And The District Court Conducts A “Patent Showdown”

Sonos sued Google in the Western District of Texas in 2020. But Google beat Sonos to the courthouse, filing a declaratory-judgment action one day earlier in the Northern District of California. Appx247-259. After this Court found venue in California more convenient, Sonos’s case ended up before the Northern District judge responsible for Google’s declaratory-judgment action. Appx15430-15431.

In 2021, the district court ordered the parties to participate in its unique “patent showdown procedure,” which the court described as “the way to get this whole thing settled.” Appx492-494. The showdown requires the “patent owner and alleged infringer [to] each select and exchange one asserted claim” and then “file cross motions for summary judgment on the two claims.” Appx485-487. If any claim survived summary judgment, the parties had to “prepare[] for a prompt

[showdown] trial,” Appx487, while the rest of the case proceeded at a standard pace, Appx502-503.

Sonos chose claim 1 of the ’885 patent. Appx4549. Broadly speaking, claim 1 covers Sonos’s zone-scene technology from the perspective of a player (e.g., a smart speaker). Appx4551. Sonos accused Google’s media players—speakers, Chromecast dongles, and Nest Hub displays—of infringement. Appx4549.

The parties cross-moved for summary judgment on claim 1. As relevant here, Google moved for summary judgment of noninfringement and contended that claim 1 was invalid as lacking written-description support for zone scenes where one speaker belongs to multiple saved groups. Appx4896-4897.

The district court held that Google infringed claim 1. Appx5410-5411. (Several months after the showdown, Google released a redesign that it claimed was noninfringing. Appx49.)

The court rejected Google’s written-description argument, holding that the specification’s “disclosures adequately convey that a zone player can be added to multiple zone scenes.” Appx5417. The court pointed to Figure 5B in the ’885 patent’s specification, which shows a

“user interface to allow a user to form a scene.” Appx5416-5417 (quoting Appx2093 10:12-19).

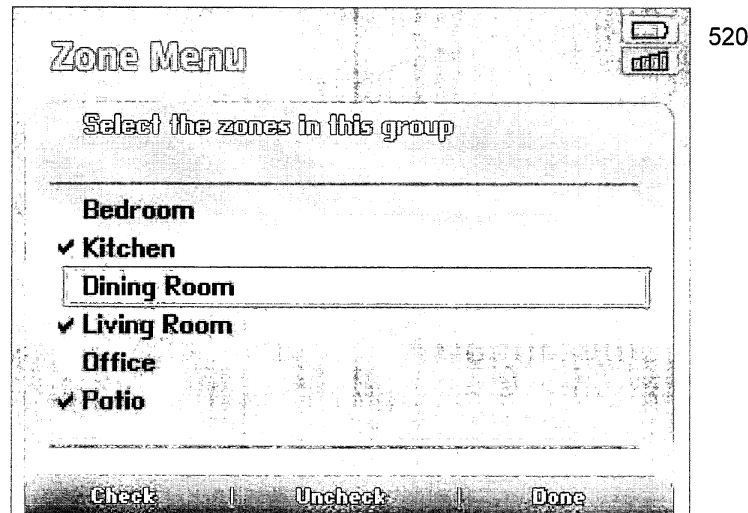


FIG. 5B

Appx2086. The specification explains that the list of zones (or speakers) above “includes ALL the zones in the system, including the zones that are already grouped.” Appx5416-5417 (quoting Appx2093 10:12-19). The court also noted that the specification discloses that “*various scenes* may be saved in any of the members in a group.” Appx5417 (quoting Appx2089 2:56-59).

Google chose claim 13 of the ’615 patent, which covers direct-control technology. The claim recites a computer-readable storage medium with instructions that enable a “control device” (such as a

smartphone) to transfer media playback to a “playback device” (such as a smart speaker). Appx5067-5068.

Here, the crucial limitation for transferring playback is “causing one or more first cloud servers to add multimedia content to a local playback queue on the particular playback device.” Appx291 20:7-15. The district court construed “playback queue” to mean “[a] list of multimedia content selected for playback.” Appx5; Appx7-8.

Google moved for summary judgment of noninfringement and invalidity, Appx4857-4888, which the district court granted, Appx1-17. The court credited Google’s expert testimony that it would have been obvious to combine Google’s YouTube Remote, which used a local playback queue, with teachings from Google’s U.S. Patent No. 9,490,998 to allow selecting a particular “paired” device from among multiple devices available for playback. Appx4878-4881. The court elevated that testimony above Sonos’s expert testimony explaining that the ’998 patent is at best ambiguous as to whether it teaches selecting a particular paired device from among multiple devices, or merely selecting any and all paired devices. Appx5150.

The District Court Invalidates The '033 Patent Before Trial

As the case moved toward trial on the remaining patents, both sides again moved for summary judgment. As relevant here, Google sought summary judgment of invalidity for the '033 patent. Appx19. The obviousness analysis again revolved around YouTube Remote and the '998 patent, although this time Google relied on what it called the “party mode” feature of YouTube Remote. Appx25. And while the '615 patent claims a *local* playback queue, the '033 patent claims a *remote* playback queue. Appx25.

The district court disregarded Sonos’s expert’s opinion that a copy of the party playlist stored on a cloud server did not qualify as a remote playback queue, as required by the '033 patent’s claims. Appx30; see Appx6330-6331. Thus, here, again, the district court found that the combination of YouTube Remote and the '998 patent rendered Sonos’s claims obvious. Appx37.

The Jury Finds Infringement But The District Court Overrides The Jury’s Verdict

The following issues remained for trial: (1) whether Google’s post-showdown redesign infringes claim 1 of the '885 patent; (2) whether any version of the accused products infringes the '966 patent; (3) whether

Google willfully infringes the '966 patent; (4) whether any asserted claims were obvious; and (5) damages. Appx10347-10350.

The jury found that Google failed to prove any of the asserted claims invalid. Appx10347-10348. It also found that Google's redesign still infringes claim 1 of the '885 patent but that no accused products infringe the '966 patent. Appx10347-10349. The jury awarded Sonos just over \$32.5 million for past infringement. Appx10350.

The parties filed post-trial motions, with each party challenging aspects of the verdict and Sonos seeking additional remedies.

Appx11069-11098; Appx11099-11135. The district court never decided those motions.² Instead, it overrode the jury's verdict based on an inapplicable affirmative defense and an invalidity theory that Google forfeited.

The court planted the seeds of its ruling early in the case when it pronounced that patentees should not be allowed to “monkey[] around with ... [their] claims” to “read on somebody else's product.” Appx528-530. Then, in the middle of trial, the court declared that a “gimmick ...

² Because the district court denied these motions as moot, Appx105, it will have to address their merits in the event of a remand.

was going on at Sonos to cover the Google product.” Appx20978. The court interrogated Sonos about “what the written description is of how you go about achieving the overlapping zone scenes.” Appx20658.

Sonos repeatedly reminded the court that it had already determined that the specification had written-description support and that Google had previously agreed not to challenge the written description at trial, Appx6992-6998, but the court remained undeterred: “I’m bringing it up myself.” Appx20661.

The court fixated on one sentence that Sonos imported from the 2006 provisional into the zone-scene specification by amendment in 2019, ordering multiple rounds of briefing on the issue (starting after the court raised that issue mid-trial and continuing post-trial).

Appx20949-20950.³ The court expressed a suspicion that Sonos improperly “snuck [new matter] in there” because the specification had “inadequate written description prior to that date.” Appx20976. Sonos reminded the court that the examiner allowed the 2019 amendment,

³ *See also* Appx7610-7616; Appx7617-7623; Appx8182-8237; Appx7943-7954; Appx9214-9230; Appx9319-9326; Appx9407-9415; Appx10484-10504; Appx10505-10525; Appx10526-10538; Appx10539-10550; Appx10937-10941; Appx11001-11018; Appx10942-10959; Appx11064-11068.

thereby determining that Sonos did not add new matter. Appx20974; Appx9326. But the court announced that the zone-scene patents likely lacked an earlier priority date and were thus invalid as anticipated by Google's products, and expressed "great concern ... that I was bamboozled by Sonos." Appx20978; Appx21410. And, returning to the concept of amending claims to cover a competitor's product, the court declared: "That, to me, is not the way the patent system should work," so "we're going to [re]visit that" after the verdict. Appx21412-21413.

The court made good on its promise and vacated the verdict on two grounds. First, the court invoked prosecution laches, rendering the zone-scene patents unenforceable. Appx51. The court held that Sonos had unreasonably and inexcusably delayed by waiting until 2019 to add a claim specifically covering overlapping zone scenes after originally filing the provisional application for that patent family in 2006.

Appx79-82. The court agreed "[t]hat Sonos diligently prosecuted patent applications in the interim." Appx81. But it held that Sonos's diligence made the delay in crafting the narrower claim for overlapping zone scenes "*all the more* unreasonable," because Sonos could have "fil[ed]

parallel applications with new claims covering the invention” earlier. Appx81.

The court also held that Google suffered prejudice. It found that Google would have struggled to investigate the priority chain for the zone-scene patents, and that earlier applications in the chain did not claim or disclose overlapping zone scenes. Appx82-84. The court acknowledged that Sonos did not extend the terms of its patents through any prosecution delay (and could not have done so). Appx84-86. But it found prejudice on the basis that Sonos “let the industry develop and only then sought to extract an invention from a much earlier application that would read on an industry trend.” Appx84-86.

The court based the latter position on the view that Sonos had not disclosed overlapping zone scenes until 2019, by improperly amending the zone-scene specification to add new matter. Because of the purported new matter, the court held that Sonos was entitled only to a 2019 priority date, making Google’s accused products prior art. Appx99. Google forfeited any priority-date challenge, including by not making one in its Rule 50 motions. But the court held the zone-scene

patents invalid, because “[t]hat which infringes if later anticipates if before.” Appx99.

Lastly, the district court contradicted, and vacated, its earlier order concluding that the zone-scene patents had adequate written description for overlapping zone scenes. Now, informed by trial evidence about how Google implemented overlapping zone scenes, the court found that the zone-scene specification disclosed overlapping groups only by inference, which “would not allow a person of skill in the art to recognize that the inventor invented what is claimed.” Appx99-105. Sonos appealed.

SUMMARY OF ARGUMENT

I. Prosecution laches reaches only egregious abuses of the statutory patent system where a patentee artificially extends the duration of their monopoly. Prosecution laches does not apply to Sonos’s zone-scene patents because the animating feature for that defense—an unfair timewise extension beyond the period Congress prescribed—is absent here. This Court should not break new ground by endorsing the doctrine’s application in this case.

Even if prosecution laches could apply here, the district court abused its discretion. The court recognized that Sonos “diligently” prosecuted the family of zone-scene patents for 13 years. Nothing in the record suggests that it was unreasonable for Sonos to prioritize other claims over the narrowed claims asserted here, particularly where Sonos submitted the new claims just before releasing its own commercial embodiment practicing them. Moreover, Google could not have been prejudiced by any prosecution delays because Sonos had patent claims covering all zone scenes (overlapping or not) long before Google’s infringing products.

II. The district court improperly decided as a matter of law that the zone-scene patents were entitled to only a 2019 priority date because of new matter, and lacked written description in any event. None of these issues went to the jury. Instead, the court stepped into the role of factfinder and impermissibly weighed the evidence in the light *least* favorable to Sonos. Moreover, the court ignored the presumption of validity and the even heavier presumption of correctness for an examiner’s entry of an amendment to the specification.

Had it applied the proper standards, the court would have found that Sonos disclosed overlapping zone scenes long before 2019—no later than its 2007 non-provisional—and that Sonos did not add new matter to the zone-scene specification in 2019. The 2007 application explained that conventional systems struggled to accommodate overlapping speaker groups, and proceeded to disclose through multiple figures and text how zone scenes allowed users to create and save groups with shared members. The one sentence that the district court found to be new matter appeared in the 2006 provisional that was incorporated by reference into every application from 2007 on, describing a figure that was also in the 2006 provisional and has appeared in every application in exactly the same form since 2007. This Court should reverse even if it finds there were disputed issues of fact because Google forfeited these issues multiple times over—including by not raising them in time for Sonos to develop and present relevant evidence to the jury, and by not raising them in its Rule 50 motions.

III. At summary judgment, the district court usurped the jury's role by resolving material factual disputes over the validity of the direct-control patents. The parties presented competing expert

testimony about the scope of the prior art, and the court had no authority to decide which expert's reading was better.

STANDARD OF REVIEW

This Court reviews de novo the district court's grant of summary judgment, *Adasa Inc. v. Avery Dennison Corp.*, 55 F.4th 900, 907 (Fed. Cir. 2022) (applying Ninth Circuit law), and of judgment as a matter of law (JMOL), *Geo. M. Martin Co. v. Alliance Machine Sys. Int'l LLC*, 618 F.3d 1294, 1300 (Fed. Cir. 2010) (applying Ninth Circuit law). JMOL is improper unless "the evidence, construed in the light most favorable to the nonmoving party, permits only one reasonable conclusion." *Id.* (citation omitted).

This Court reviews for abuse of discretion the district court's determination of prosecution laches. *Personalized Media Commc'ns, LLC v. Apple Inc.*, 57 F.4th 1346, 1353 (Fed. Cir. 2023) (*PMC*). The district court abused its discretion if it made "an error of law or clearly erroneous factual findings." *Id.* (citation omitted).

ARGUMENT

I. The District Court Abused Its Discretion In Holding The Zone-Scene Patents Unenforceable Because Of Prosecution Laches.

The district court's laches ruling was a blatant exercise in judicial legislation. The court minced no words about its disapproval of using continuation applications to tailor claims to commercial embodiments. Undeterred by this Court's emphatic holding that Congress had condoned that practice, the district court declared that this is "not the way the patent system should work." Appx21412. So the court distorted an equitable doctrine that has never been applied to this circumstance, and that simply does not fit, to reshape the patent system more to its liking. And in support of that extraordinary result, the court recast an entirely unremarkable prosecution into a narrative of Sonos "enrich[ing]" itself through "delay and sleight of hand." Appx105.

This Court has two options for reversal. The first is holding that the doctrine is categorically unavailable here because everyone agrees that nothing Sonos did extended the duration of its patent monopoly. The second is holding that Google failed to prove either element of laches.

A. Prosecution laches does not apply because Sonos did not extend the duration of its monopoly.

1. Prosecution laches should be used “sparingly.” *Symbol Techs., Inc. v. Lemelson Med., Educ. & Rsch. Found.*, 422 F.3d 1378, 1385 (Fed. Cir. 2005). It addresses only “egregious cases of misuse of the statutory patent system,” *id.*, where a patentee artificially extends its monopoly period through bad-faith prosecution conduct that delays a patent’s issuance “and thus puts off the free public enjoyment of the useful invention,” *Woodbridge v. United States*, 263 U.S. 50, 56 (1923). Before this case, no court has ever found a patent unenforceable under prosecution laches unless the patentee’s prosecution delay extended its monopoly period, which everyone agrees Sonos did not do.

The Supreme Court’s early cases on prosecution laches punished a patentee who secured an “undue extension of the patent monopoly,” thereby “subvert[ing] [the] limitations” of patent law. *Webster Elec. Co. v. Splitdorf Elec. Co.*, 264 U.S. 463, 466 (1924). For example, the Court applied prosecution laches to a patentee who “postpone[d]” “the beginning of the term of his monopoly” to a time when he could profit most from the patent. *Woodbridge*, 263 U.S. at 56. That “designed delay” was “an evasion of the [patent] statute” because it “put[] off the

free public enjoyment of the useful invention.” *Id.*; see also *Crown Cork & Seal Co. v. Ferdinand Gutmann Co.*, 304 U.S. 159, 168 (1938) (recognizing prosecution laches as punishing the “enlarge[ment] [of] the patent monopoly beyond that contemplated by the [patent] statute”).

This Court has adopted the same rule, and its cases fit the same pattern. Its first prosecution laches opinion rebuked a patentee who “deliberately postponed the free public enjoyment” of the claimed invention through a “deliberate and consistent course of conduct” that caused “exceptional delay in advancing the prosecution and the issuance of a patent.” *In re Bogese*, 303 F.3d 1362, 1363-65 (Fed. Cir. 2002). Specifically, the Patent Office rejected claims in a patent application, yet the applicant included the same rejected claims in a dozen successive continuation applications without amending or addressing the reasons for the rejection. *Id.* Worse, the applicant also abandoned each previous application. *Id.* By the time the Patent Office denied the latest continuation application based on prosecution laches, nearly 20 years had passed since the original application. *Id.* at 1365.

In every prosecution laches case since, patentees delayed prosecution in bad faith to extend their monopolies beyond the statutory

period by *decades*—typically through tactics like drowning the Patent Office in thousands of identical claims. *Infra* § I.B.1. In one case, the patentee “bulk-filed” 381 applications that claimed priority to more than 40 applications filed between 1969 and 1983, and then managed to delay prosecution for 44 years from the first application. *Hyatt v. Hirshfeld*, 998 F.3d 1347, 1353-56 (Fed. Cir. 2021). In another, the patentee bulk-filed 328 applications that claimed priority to a 1987 application, and then finagled delays so the relevant patent did not issue for another 25 years. *PMC*, 57 F.4th at 1350-53; *see Symbol Techs.*, 422 F.3d at 1380, 1386 (patentee delayed issuance up to 39 years for applications initially filed in the 1950s). The defining feature of each case was a patentee who abused the patent system by manipulating continuations to extend their patent monopoly far beyond the then-applicable 17-years-from-issuance term Congress had prescribed.

Prosecution laches provided an important safeguard against these sorts of abuses back when the patent term ran from the date of issuance. Under that regime, patentees could “abandon[] applications and fil[e] continuing applications in their place” almost “indefinitely,”

thereby exploiting both the original application's priority date and the continuing application's later issuance date. *Hyatt*, 998 F.3d at 1351-52 (citation omitted).

Congress largely eliminated that problem with its 1995 amendment that changed the patent term to run from the application's filing date, rather than the issuance date. *Id.* Under today's regime, a delay in prosecution normally *erodes* the monopoly period, because the clock starts ticking as soon as the inventor files a non-provisional priority application.

Sonos filed its applications after 1995, so whether Sonos prosecuted the zone-scene patents at a snail's pace or at lightning speed, its patents will expire in 2027. Appx84. Any delay in prosecution reduced Sonos's zone-scene monopoly period by over a decade, to under eight years. Appx7608. The crucial factor that drove every previous prosecution laches case is thus missing here.

2. The district court did not suggest that Sonos secured an improper timewise extension of its patents. Instead, it found that the delay was otherwise inequitable, relying on false premises—factual and legal.

The first faulty premise was that Sonos had “*never claimed ... [or] disclosed*” overlapping zone scenes until years after competitors developed products practicing that invention. Appx83. If the premise about disclosure were correct, then the claims would be invalid. Courts do not need prosecution laches to address such concerns. *See Symbol Techs.*, 422 F.3d at 1385 (noting that filing continuations is permissible, and that concerns over “subject matter” added to support new “claims as the development of an invention progresses” should be addressed via validity doctrines). Regardless, the specification *did* teach overlapping zone scenes; and Sonos *did* obtain broad claims covering *all* zone scenes (overlapping or not) long before any competitors offered products with overlapping zone scenes. *Infra* §§ I.B.2, II.A. And while attributing a nefarious motive to Sonos, the court failed to acknowledge that Sonos had good reason to add those narrowed claims limited to overlapping zone scenes in 2019: to cover *its own* imminent commercial embodiment, released in 2020. Appx20287.

A second faulty premise was that the prior art disclosed “zone scenes.” Appx90-91. That premise led the court to conclude Sonos could validly claim nothing but “niche variations [on zone scenes] of

little consequence.” Appx72. Whether the prior art disclosed zone scenes was a central factual dispute at trial, Appx21846-21850 (Google’s closing argument), which Google lost, Appx10347-10348. *See Akamai Techs., Inc. v. Cable & Wireless Internet Servs., Inc.*, 344 F.3d 1186, 1192 (Fed. Cir. 2003) (courts “must presume that the jury resolved all factual disputes in favor of the prevailing party ... as long as they are supported by substantial evidence”). The clearest explanation for the jury’s validity finding is that it agreed with Sonos that the prior art did not teach zone scenes (overlapping or not). Appx21810-21821. The district court thus had no basis for these fact-findings (and indeed cited none).

Underlying all this was an incorrect legal premise: that it is inequitable to use continuation applications to add claims that cover a competitor’s products. This Court has held that it is not “in any manner improper” to “amend [to] insert claims intended to cover a competitor’s product the applicant’s attorney has learned about during ... prosecution,” including through continuations. *Kingsdown*, 863 F.2d at 874; *see Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 909 n.2 (Fed. Cir. 2004). That becomes improper only when paired with some

abuse that extends the term of a patent’s monopoly—which is concededly missing here.

B. The district court erred in applying prosecution laches to standard continuation practice yielding no prejudice.

Even assuming prosecution laches could apply here, the district court erred. Google had to prove, by clear and convincing evidence, that: (1) Sonos’s “delay in prosecution [was] unreasonable and inexcusable under the totality of circumstances”; and (2) Google “suffered prejudice attributable to the delay.” *PMC*, 57 F.4th at 1354, 1357; *see Cancer Rsch. Tech. Ltd. v. Barr Lab’ys, Inc.*, 625 F.3d 724, 732 (Fed. Cir. 2010) (applying clear-and-convincing standard for the defense of inequitable conduct); *Therasense, Inc. v. Becton, Dickinson & Co.*, 649 F.3d 1276, 1287 (Fed. Cir. 2011) (en banc) (same); *cf. Microsoft Corp. v. i4i Ltd. P’ship*, 564 U.S. 91, 95 (2011) (35 U.S.C. “§ 282 requires an invalidity defense to be proved by clear and convincing evidence”). Google failed to prove either element.

1. Sonos did not unreasonably delay prosecution.

a. Google presented literally no evidence of unreasonable or inexcusable delay. Google (and the court) relied solely on the time that

elapsed between the filing date of the provisional and the filing date of the claims asserted here. The district court's opinion contained the seeds of its destruction in agreeing that Sonos "diligently prosecuted [its] patent[s]" in the priority chain between 2006 and 2019, when Sonos first expressly limited some claims to zone scenes that overlap. Appx80-81. It did not (and could not) fault Sonos for the seven years that the Patent Office took to issue the first patent. And it had no legitimate complaint about anything Sonos did during prosecution in the next six years.

The prosecution up to that point was not only diligent, but also unremarkable. After Sonos filed the 2006 provisional and 2007 non-provisional applications, its sequential continuations claimed different aspects of its zone-scene invention disclosed in the specification. Sonos never abandoned any applications in the priority chain for the zone-scene patents. Contrary to the district court's insinuations, Appx98, nothing in the record suggests that those applications buried the Patent Office in an inordinate volume of materials, or that any aspect of Sonos's prosecution strategy troubled the Patent Office in any way or caused any prosecution delay. All Sonos did was keep the trains

moving on each of its applications from start to finish, through normal continuation practice that this Court has stressed is “legitimate” and can trigger prosecution laches only “sparingly lest statutory provisions be unjustifiably vitiated.” *Symbol Techs.*, 422 F.3d at 1385.

Unlike the patentees in *PMC* and *Hyatt*, Sonos did not overwhelm the Patent Office with “hundreds of burdensome” applications with hundreds of claims each. *PMC*, 57 F.4th at 1354; *Hyatt*, 998 F.3d at 1353. *Hyatt*, for example, pursued about 45,000 independent claims in total, which the Patent Office estimated would take “532 years of examiner time” to process. *Hyatt*, 998 F.3d at 1353-55; *see PMC*, 57 F.4th at 1350-51 (applications had as many as 20,000 total claims). Here, nothing in the record even hints that the Patent Office struggled to process the zone-scene applications.

Nor did Sonos “intentionally create[]” any delay by, for example, “engaging in a pattern of rewriting claims entirely ... midway through prosecution [to] restart[] examination,” or by filing applications with unamended, previously examined claims simply to keep the priority chain alive rather than “substantively advance prosecution.” *Hyatt*, 998 F.3d at 1368; *PMC*, 57 F.4th at 1355; *Bogese*, 303 F.3d at 1363-65, 1369.

Rather, Sonos properly amended its claims over time and never abandoned any applications in the patents' priority chain.

In short, Sonos's conventional prosecution conduct is not even in the same universe as the pattern of bad-faith conduct that has previously triggered prosecution laches.

b. The district court discounted the diligent prosecution history through 2019 by zeroing in on the time it took Sonos—“*over thirteen years*,” Appx79-80—to narrow its claims to *overlapping* zone scenes. The court ignored that more than half of that period (seven years) was time it took the Patent Office to issue the first ancestor patent. Notably, the Patent Office granted Sonos a term adjustment of almost four additional years precisely because Sonos was not to blame. Appx8463 (granting 1443-day adjustment for U.S. Patent No. 8,483,853). But the court declared that Sonos should have acted earlier to take the “small step” of “filing parallel applications with new claims covering” the overlap element more specifically. Appx81. That was wrong on multiple levels.

To start, a delay in prosecuting particular claims, on its own, is not enough to trigger prosecution laches. Any delay must be

“unreasonable,” which depends on “the specific circumstances” surrounding the prosecution history. *Hyatt*, 998 F.3d at 1366. Google presented no evidence that Sonos’s sequencing decision was at all unreasonable. And the district court cited none. Instead, it faulted Sonos for “never provid[ing] any sworn explanation for why it waited until April 2019 to claim overlapping zone scenes.” Appx80. But the burden was on Google; Sonos had no obligation to explain its sequencing decisions and reveal its prosecution strategies. And as the court knew, Sonos did not introduce overlapping zone scenes into its own products until 2020. Appx20287. It is perfectly reasonable for a patentee to wait to spend the resources to claim a particular feature until the patentee is ready to practice it in a commercial product.

More generally, no laches case has ever suggested that a court can isolate one prosecution decision just because that is what ended up “matter[ing]” in a particular litigation. Appx81. The question “of unreasonable delay is not limited to the circumstances surrounding the *particular* application at issue,” but encompasses more broadly “the prosecution history of *all* of a series of related patents.” *Hyatt*, 998 F.3d at 1362 (latter part quoting *Symbol Techs.*, 422 F.3d at 1386) (emphases

added). That focus is inherent in the rule that the doctrine focuses on the “totality of the circumstances,” *Hyatt*, 998 F.3d at 1363—not on any isolated decision on when to claim a particular aspect of the invention.

The court’s focus on that one decision presents a frontal assault on the continuation practice Congress codified, the Patent Office implements, and this Court has blessed. 35 U.S.C. § 120; *Kingsdown*, 863 F.2d at 874. Continuation applications are a standard feature of patent prosecution. They are how “the patent examiner and the applicant, in the give and take of rejection and response, work toward defining the metes and bounds of the invention to be patented.” *In re Buszard*, 504 F.3d 1364, 1366-67 (Fed. Cir. 2007).

Moreover, the court was wrong to suggest that adding a set of claims is a “small step.” Prosecution is expensive and time-consuming. To force a patentee to prosecute all its claims at once would squander one of the most important benefits of continuation applications: easing the burden on applicants who lack the resources to prosecute applications concurrently and would otherwise “be forced to accept protection on less than [they] had [the] right to protect.” The Comments of the Biotechnology Industry Organization on the USPTO’s

Proposed Rule Changes, 25 Biotech. L. Report 473, 475 (2006). It is not for a court to change the law, particularly where Congress has considered, and rejected, amendments aimed at modifying continuation practice.⁴

The district court’s approach would discourage the early and complete disclosure of new innovations and imperil innumerable patents with long priority chains. There are many thousands of patents with spans of more than ten years from the earliest priority date to filing date. *See* PatentsView, USPTO, Annualized Data Tables, <http://tinyurl.com/3a32yrxp>. Google itself owns such patents—including some with 14-year gaps that it asserted against *Sonos* in other litigation. *See Google LLC v. Sonos, Inc.*, No. 20-cv-03845-EMC (N.D. Cal.) (Patent Nos. 10,229,586 and 10,140,375). They are all vulnerable to challenge if courts can just deem them unreasonably late.

⁴ *Compare* Patent Reform Act of 2005, H.R. 2795, 109th Cong. § 8 (2005) (proposing granting the USPTO Director authority to limit continuation practice so long as the limitations do not deny “applicants an adequate opportunity to obtain claims for any invention disclosed in an application for patent”), *with* Patent Reform Act of 2005: Hearing Before the Subcomm. on Courts, the Internet, and Intellectual Property, 109 Cong. (2005), p. 21 (statement of Robert B. Chess) (applauding the rejection of the proposal to permit limitations on continuation practice).

c. The district court mentioned two other points in support of its ruling—both meritless. The first was a remark from a Sonos lawyer that the priority chain was “confusing.” Appx82 (quoting Appx20969). But any confusion in the priority chain was merely a function of standard continuation practice. Google submitted *no evidence* that Sonos engineered the confusion—much less that it did so for inequitable purposes or that any purported confusion was at all relevant to the delay in prosecuting the zone-scene patents.

The second was that Sonos submitted thousands of pages of material to the Patent Office (via Information Disclosure Statements) during prosecution. Appx98. Many of those pages were litigation filings that post-date the applications; far from being “superfluous,” Appx98, Sonos submitted them to comply with Patent Office regulations. *See* 37 C.F.R. § 1.56 (duty of candor). More important, Google offered *no evidence* that the materials submitted were excessive or that they in any way impeded the Patent Office’s examination.

* * *

In sum, nothing in the district court’s opinion came close to showing that Sonos perpetrated the sort of unreasonable and

inexcusable delay that amounts to “egregious ... misuse of the statutory patent system” and can trigger prosecution laches. *Symbol Techs.*, 422 F.3d at 1385.

2. Google suffered no prejudice.

The district court had no basis for finding prejudice. Google had to show by clear and convincing evidence that Sonos’s invention remained out of public view while Google invested in its infringing products during the purported delay. *See Cancer Rsch.*, 625 F.3d at 729-30; *Woodbridge*, 263 U.S. at 56 (recognizing that delay prejudices those “without knowledge” of the invention). The record negates any such conclusion.

Google claims to have “beg[un] investing in its products” in 2015. Appx11053 (Google motion). By then, Sonos had long since disclosed overlapping zone scenes *and* secured patent claims that covered multiple zone scenes (overlapping or not).

Sonos first disclosed overlapping zone scenes nearly a decade earlier—in 2006—via its provisional application, which became public in 2013. Appx8187; Appx8191. Sonos’s 2007 non-provisional application likewise disclosed overlapping zone scenes. *See infra* § II.A.

And the applications for the zone-scene patents incorporated by reference the 2006 provisional application and the 2007 non-provisional application that issued in 2013. *See* Appx8194-8195; Appx8186 (priority chain for both patents).

Sonos also secured broad claims that covered products with overlapping zone scenes. Sonos's U.S. Patent No. 8,843,228, a direct ancestor to the '885 and '966 patents, issued in September 2014, and claims a controller programmed to "invoke a zone scene of the one or more zone scenes," each zone scene containing "two or more of the plurality of independent playback devices." Appx8527-8545, claim 6; *see also id.* (claim 10); Appx7493-7575 (2018 presentation to Google showing overlapping groups as an implementation that infringes the '228 patent). In other words, the '228 patent claimed a controller that displayed multiple zone scenes and allowed a user to choose from among the zone scenes. Nothing in the claims of the '228 patent prohibits overlapping zone scenes. So Google's overlapping zone scenes would have infringed the '228 patent from the start. Yet Google continued to pursue the release of its infringing products. Google's decision to launch a product that infringed already-issued claims

precludes showing prejudice. *See i4i Ltd. P'ship v. Microsoft Corp.*, 598 F.3d 831, 863 (Fed. Cir. 2010) (recognizing that an infringer cannot complain about the costs it incurred because of its infringing activities).

This case is thus nothing like the cases finding prejudice based on an infringer's investments in infringing products. In *PMC*, for example, the patentee had a strategy of "hiding its technologies, quietly monitoring infringement, and rolling out patents over time" to bring infringement suits. *PMC*, 57 F.4th at 1352 (cleaned up). Because the patentee "conceal[ed] its inventions," unsuspecting inventors unwittingly invested in infringing products, only to be ambushed with patent claims. *Id.* at 1353.

The district court nonetheless concluded that Google could not have been expected to figure out that Sonos claimed overlapping zone scenes because "unearthing the layers of file histories would have resembled an exercise in archeology." Appx82. No archeology was necessary to read the 2006 provisional application, the 2007 non-provisional application, or the '228 patent, which disclosed, and then claimed, the invention well before Google invested in its infringing products in 2015.

The district court’s prejudice analysis also overlooked that Sonos and Google met in 2013 and 2014 to discuss the possibility of integrating Google’s streaming service with Sonos’s products. *Supra* 11-12. That meeting gave Google ample notice to investigate Sonos’s patents, which would have revealed Sonos’s zone-scene patent family. In fact, Sonos specifically gave Google notice in 2016 that Google was infringing the ’228 patent. Appx7601-7602.

Moreover, the district court discounted the specifications and support in the 2006 and 2007 applications, saying that claims (not specifications) “define the scope of a patented invention.” Appx83. It took the startling position that anything not claimed in the first application is “dedicated to the public.” Appx81 (quoting *Eli Lilly & Co. v. Hospira, Inc.*, 933 F.3d 1320, 1334 (Fed. Cir. 2019) (citations omitted)). But *Eli Lilly* has nothing to do with finding prejudice for purposes of prosecution laches. That case involved the “disclosure-dedication” limitation on the doctrine of equivalents—that a patentee cannot use the doctrine of equivalents to expand claims to capture subject matter expressly disclosed but not claimed. *Eli Lilly*, 933 F.3d at 1329-34. Moreover, the very next sentence of *Eli Lilly* recognizes

that material “claimed in a continuation or other application based on the disclosure” is not dedicated to the public—exactly what happened here. *Id.* at 1334; *see Gen. Talking Pictures Corp. v. W. Elec. Co.*, 304 U.S. 175, 182-83 (1938) (rejecting argument that inventor filing “an application for patent showing and describing, but not claiming, certain inventions cannot obtain a valid patent for said inventions” through a continuation application because the original application disclosed inventions before their public use). Otherwise, continuation applications—which by definition include claims omitted from the ancestor applications—would be useless.

In sum, any “prejudice” Google suffered by investing in and releasing infringing products was entirely its own making.

II. The District Court Erred In Granting JMOL On The Priority Date And Written Description Of The Zone-Scene Patents.

In the same opinion that found Sonos’s zone-scene patents unenforceable for prosecution laches, the district court entered a contradictory judgment that the patents are also invalid. The district court found the patents anticipated in two steps: (1) finding that Sonos’s zone-scene patents lacked adequate written-description support without

the benefit of one sentence that Sonos added to the specification from the provisional by way of a 2019 amendment; and (2) concluding that this delayed the patents' priority date to 2019, which meant that Google's accused products anticipated them. The court then vacated its summary judgment ruling on written description, finding that the specification lacked adequate support for overlapping zone scenes even after the 2019 amendment. Here is the contradiction: If Sonos did not disclose the invention before 2019, there was no 13-year delay in claiming it and no basis for finding prosecution laches. The district court's rulings thus cannot stand together. Regardless, the invalidity finding independently merits reversal.

Before explaining why, it is important to appreciate the unorthodox—and highly unfair—procedural posture in which this issue arose. Google raised a written-description argument at summary judgment (with an undeveloped allegation that Sonos added unspecified new matter), focusing primarily on the same element that drove the district court's JMOL ruling—"overlapping" groups. Appx4913-4917. Separately, Google's expert explicitly noted the 2019 amendment to the specification that the district court later seized upon. Appx10985. Yet,

Google did not advance either a new-matter or priority-date challenge based on the 2019 amendment before trial. *See* Appx4913-4914. The district court denied Google’s summary judgment motion. Appx5416-5419.

Google never presented either a written-description or new-matter challenge at trial through its expert or jury instructions. Quite the opposite: Google agreed before trial (and reaffirmed mid-trial) that it would not try written description to the jury, Appx6993; Appx6995; Appx21407; conceded a 2005 conception date of the zone-scene invention, Appx59; Appx20447; Appx20451; Appx20643; and effectively conceded a 2006 priority date, Appx11010-11016.

In the face of Google’s forfeiture, the district court, in the middle of trial, seized upon a single sentence in the 2019 amendment—the very same sentence Google’s expert had noted nearly a year earlier. Based on that sentence, the court came to believe that Sonos lacked written-description support for overlapping zone scenes before the amendment, and that Sonos had tricked the Patent Office into issuing the zone-scene patents with a 2006 priority date.

The court never presented these issues to the jury or allowed Sonos to develop and present evidence refuting that position. And Google did not pursue them in its Rule 50(a) or 50(b) motions—both of which Google filed *after* the district court repeatedly raised its concerns. Nevertheless, the court granted post-verdict JMOL to Google based on a trial record built around different issues. Appx86-99. But each step of the court’s analysis depended on factual assertions that were either wrong, or at a minimum disputed. *See Commonwealth Sci. & Indus. Rsch. Org. v. Buffalo Tech. (USA), Inc.*, 542 F.3d 1363, 1380 (Fed. Cir. 2008) (new matter is a question of fact); *Koito Mfg. Co. v. Turn-Key-Tech, LLC*, 381 F.3d 1142, 1149 (Fed. Cir. 2004) (written description and anticipation are questions of fact); *supra* 25 (JMOL standard). The court left no doubt that it was finding facts: It explicitly announced that any “declarative statements” in its opinion constituted “findings of fact,” Appx52, and even found Sonos’s inventor “not credible,” Appx91. And the court did not acknowledge, let alone apply, Google’s burden of proof to invalidate an issued patent or the further presumption of correctness that applies to the examiner’s entry of an amendment to the specification. *See infra* 50, 60.

When these standards are properly applied, the evidence permits only one reasonable conclusion as a matter of law: Sonos disclosed overlapping zone scenes by 2007 at the latest, *infra* § II.A, and thus, Sonos did not add new matter to the specification in 2019, *infra* § II.B. At a minimum, Sonos created a dispute of fact as to each. Regardless, reversal is required, because the issues were forfeited multiple times, including when no one—neither Google nor the district court—raised them in time to afford Sonos the opportunity to develop relevant expert opinions and try them to a jury, and again when Google failed to raise them in Rule 50 motions. *Infra* § II.C.

A. Sonos disclosed overlapping zone scenes no later than 2007, even without the 2019 amendment.

“The priority date for later-added patent claims depends on when the claimed subject matter first appeared in the chain of patent applications from which the claims arose.” *Paice LLC v. Ford Motor Co.*, 881 F.3d 894, 906 (Fed. Cir. 2018). “For claims to be entitled to a priority date of an earlier-filed application, the application must provide adequate written description support for the later-claimed limitations.” *Id.*; see 35 U.S.C. § 120. That means that Sonos’s earlier-filed application must “describe[] the invention in such a way that it is

understandable to a person of ordinary skill in the art.” *Pozen Inc. v. Par Pharm., Inc.*, 696 F.3d 1151, 1167 (Fed. Cir. 2012). And to overcome the presumption of a patent’s validity, Google had to “show a lack of written description by clear and convincing evidence.” *Rivera v. ITC*, 857 F.3d 1315, 1319 (Fed. Cir. 2017).

Sonos disclosed overlapping zone scenes long before the 2019 amendment. The 2006 provisional application, or, at the latest, the 2007 non-provisional application provided adequate written-description support. *See* Appx8238-8365. Sonos incorporated both applications by reference into all the subsequent continuation applications in the patent family, including the ’885 and ’966 patents. And the 2007 non-provisional specification contained adequate written-description support by itself. The zone-scene patents are thus entitled to a priority date that safely predates Google’s 2015 release of its infringing products (and Google did not offer any purported prior art in the 2006-2007 timeframe).

The 2007 application explains that Sonos’s invention addresses a problem with conventional audio systems: the need for overlapping speaker groups. It observes that “traditional system[s]” proved

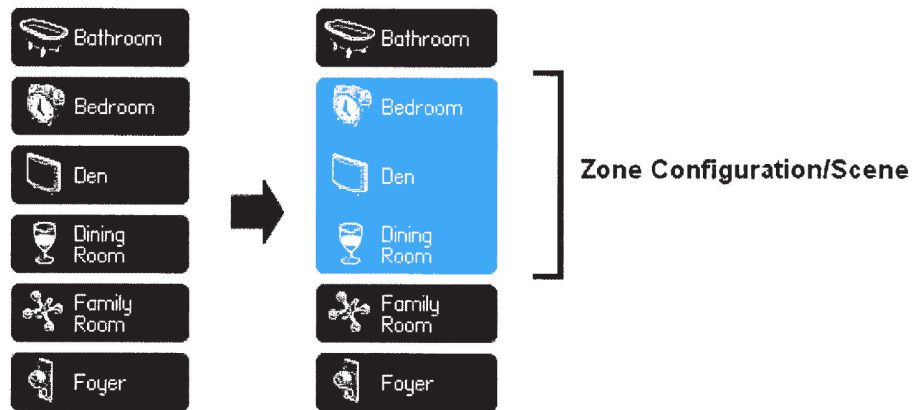
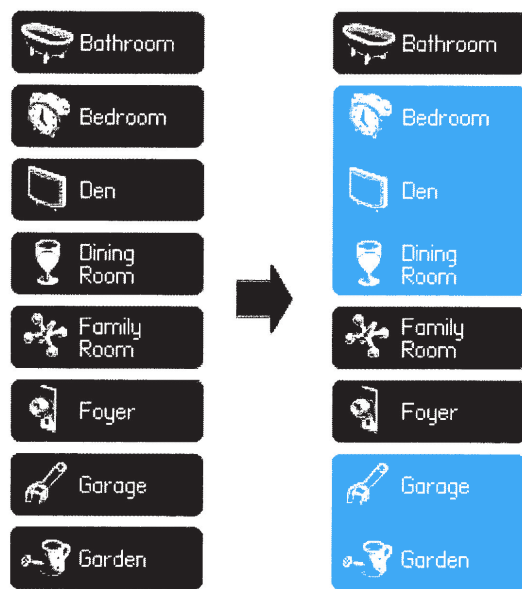
cumbersome for users who wanted to listen to different audio sources on different combinations of players at different points in the day.

Appx8332-8333. It offers as an example, listening “in a bedroom, a bathroom and a *den*” at one point; later, “in the *den* and the living room”; and yet later “in the *den*, the living room, and a kitchen.”

Appx8332 (emphases added). It continues: “Because the [three groups] contain the den”—i.e., because the groups overlap—it is “difficult for the traditional system to accommodate the requirement of dynamically managing the ad hoc creation and deletion of groups.” Appx8332-8333.

The specification then explains how Sonos’s invention solves that problem by allowing the user to predefine and save multiple groups of speakers—including groups that contain overlapping members like the den—and then later invoke any group for synchronous playback.

Figures 3A and 3B of the 2007 application, for instance, illustrate two zone scenes with overlapping members:

**FIG. 3A****FIG. 3B**

Appx8359-8360 (colorization added); *see* Appx8251, Appx8260-8261 (same images and descriptions in the 2006 provisional). The corresponding descriptions explain that the “Morning” zone scene “link[s] the Bedroom, Den and Dining Room,” Appx8345 (referring to Figure 3A), while the “Evening” zone scene overlaps with the same

three—“Bedroom, Den, [and] Dining Room”—and *adds* the “Garage [and] Garden,” Appx8346 (referring to Figure 3B).

These figures and corresponding descriptions tell a person of ordinary skill that the Morning and Evening scenes overlap. That is precisely what Sonos’s expert said when opining on the same disclosures in the ’885 specification at summary judgment. Appx5210-5211. Yet the district court disregarded these disclosures and the expert’s opinion about what they mean to one skilled in the art. The court said Sonos was “picking and choosing claim elements from different embodiments that are never linked together in the specification.” Appx92 (citation omitted). But these embodiments and corresponding descriptions not only appear together, but are presented as complementary components of the same Figure 3. Especially in light of the problem that Sonos described earlier in the specification, *supra* 50-51, a person of ordinary skill would understand that the Morning and Evening zone scenes share overlapping members. At the very least, a reasonable juror could so find. *See supra* 25.

Sonos’s expert also opined at summary judgment that a skilled artisan would understand Figure 6, which remains unchanged from the

2007 specification, as disclosing multiple, coexisting zone scenes that can share overlapping members. Appx5209-5211.

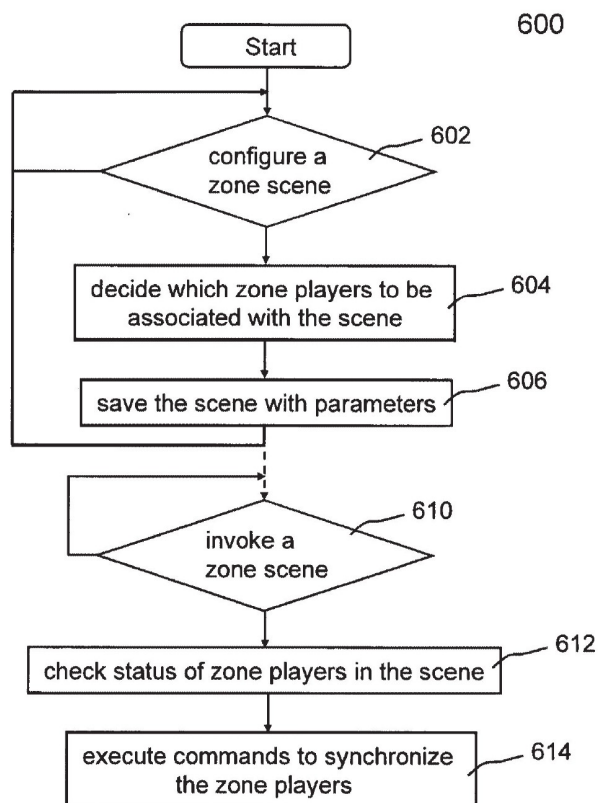


FIG. 6

Appx8365.

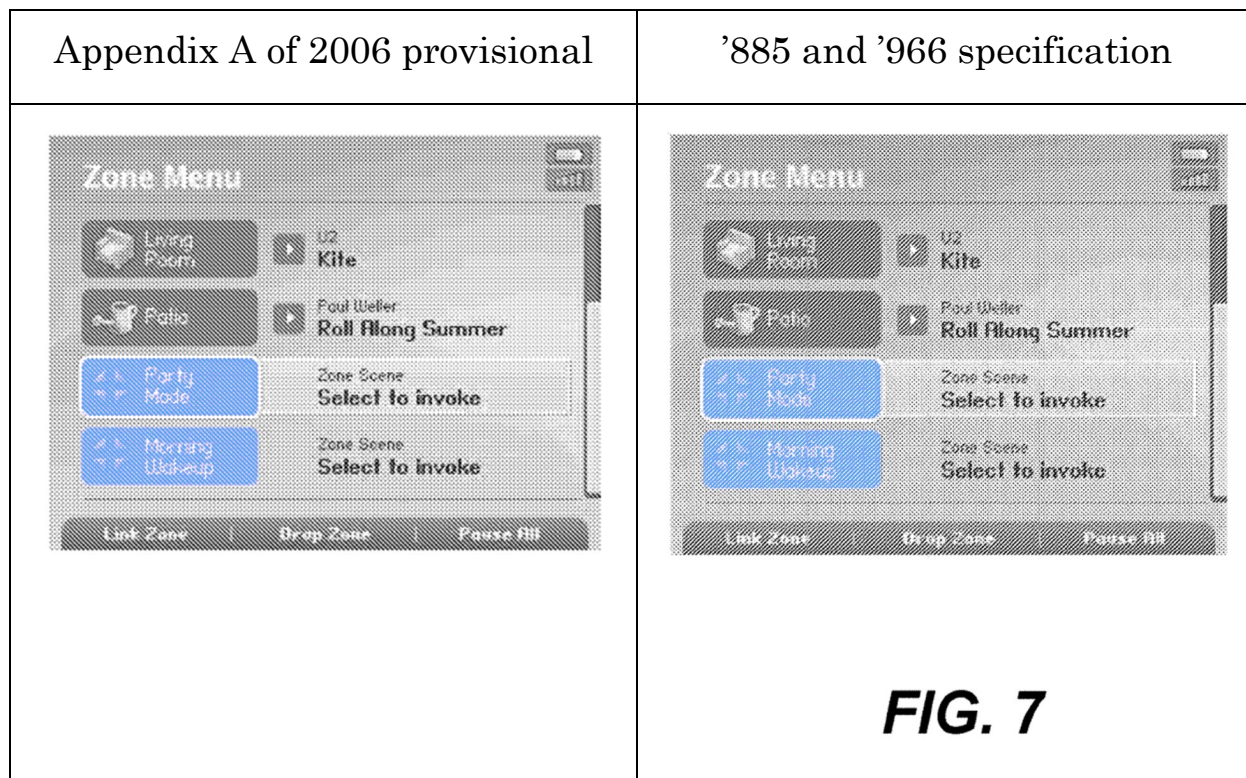
The specification explains that, at step 604, “a [controller] is provided to facilitate a user to select *any* of the players in the system to form respective groups each of which is set up per a scene.” Appx8334 (emphasis added). Then, when a user saves a zone scene to invoke later (step 606), the specification explains that “*various scenes* may be saved in *any of the members* [i.e., players]....” Appx8334 (emphases added). If

two zone scenes could not share the same speaker, there would be no reason for any speaker to save “various scenes” to invoke later, because a speaker would only save, at most, one scene. *See* Appx5210-5211. The district court itself invoked this various-scenes sentence when denying Google’s written-description challenge before trial. Appx5417.

As yet further evidence of Sonos’s early disclosure of overlapping zone scenes, both the 2006 and 2007 applications also describe a zone scene comprised of *all the players in a system* alongside a zone scene made up of a *subset* of players. Specifically, after describing a Morning zone scene, the 2006 provisional explains that “[o]ptionally, a system may be supplied with a command that *links all zones* in one step” as “a simple form of a zone scene.” Appx8252 (emphasis added); Appx8345-8346 (2007 non-provisional). By disclosing two zone scenes that necessarily share players, these descriptions show that Sonos’s invention encompassed overlapping zone scenes. *See* Appx5210.

Google’s own expert acknowledged this when testifying on obviousness. He testified that Figure 7 showed two zone scenes: “One is the morning wake-up zone scene ... that is the den, the bedroom, et cetera; and then another one which is Party Mode, which is all of the

zones in the house, *all of the speakers in the house.*” Appx21338 (emphasis added). In other words, he agreed that this image alone discloses overlapping zone scenes. As illustrated below, Sonos first disclosed this same figure in the 2006 provisional:



Appx8196-8197 (colorization added); Appx8263.

Without acknowledging the testimony of Google’s own expert, the district court rejected the import of Figure 7 by insisting that at the time of the 2006 provisional, a skilled artisan would not “have ... understood that the ‘Party Mode’ zone scene would group all of the zone players in a system.” Appx90. That was at least a disputed question of

fact. Even Google itself conceded at one point that the conception documents, referred to as the “UI [user interface] documents,” “disclose a user-configurable zone scene such as a morning scene that includes fewer than all zone players, as well as a party mode zone scene that includes all zone players, thereby necessarily disclosing an overlap between those zone scenes.” Appx10954. The district court simply failed to review all this evidence in the light most favorable to Sonos, or against the presumption of validity.

To make matters worse, the court based its conclusion on a credibility determination. The court found Sonos’s inventor’s testimony about differences between the conception documents and the provisional application “not credible.” Appx91. That flouted the axiom that “credibility determinations, the weighing of the evidence, and the drawing of legitimate inferences from the facts are jury functions, not those of a judge.” *Hangarter v. Provident Life & Acc. Ins. Co.*, 373 F.3d 998, 1005 (9th Cir. 2004) (citation omitted).⁵

⁵ The district court later veered into an irrelevant discussion of the “dynamic leader rating” in Google’s system, finding that “nothing in the specification of the patents in suit explained such a solution.” Appx103-104. But the claims do not recite a “dynamic leader rating”—that is just

This Court should reverse the invalidity findings. Contrary to the district court’s view, this was not “a case of the industry leading with something new and, only then, an inventor coming out of the woodwork to say that he had come up with the idea first.” Appx52. And the invention was not “lurking beneath the surface.” Appx86. Google stipulated—and the court agreed—that Sonos “conceived of the claimed invention in 2005,” the year before it filed its provisional application. Appx85. And every version of the application from then on described the invention, in multiple ways, for anyone to see.

B. Sonos did not add new matter to the zone-scene specification in 2019.

The basis of the district court’s conclusion that the claims lacked written description was a finding that Sonos’s 2019 amendment added new matter to the specification by adding a single sentence: “The list of zones in the user interface 520 includes ALL the zones in the system, including the zones that are already grouped.” Appx94-99. The

how Google allegedly implemented overlapping zone scenes—so Sonos was not required to provide such support. *See Crown Packaging Tech., Inc. v. Ball Metal Beverage Container Corp.*, 635 F.3d 1373, 1383 (Fed. Cir. 2011).

addition of this sentence cannot be a basis for invalidating the patent because the rest of the disclosures discussed above—the problem to be solved, the solution described in Figures 3A and 3B, the description of an all-players zone scene, and Figures 6 and 7—supported the claims on their own.⁶ Nor does that added sentence justify the district court’s narrative that Sonos engaged in an underhanded tactic to shore up the written description: Before ever adding the offending sentence, Sonos presented claims requiring overlapping zone scenes to the Patent Office, and the Patent Office did not issue a written-description rejection in response. *Infra* 66-67. Regardless, the district court’s new-matter finding was wrong—both legally and factually—and, at a minimum, sufficiently disputed to preclude JMOL.

Sonos’s amendment to the specification complied with the Patent Office’s regulations that “material incorporated by reference into the specification or drawings of an application” may be inserted “by way of an amendment to the specification or drawings” as long as the

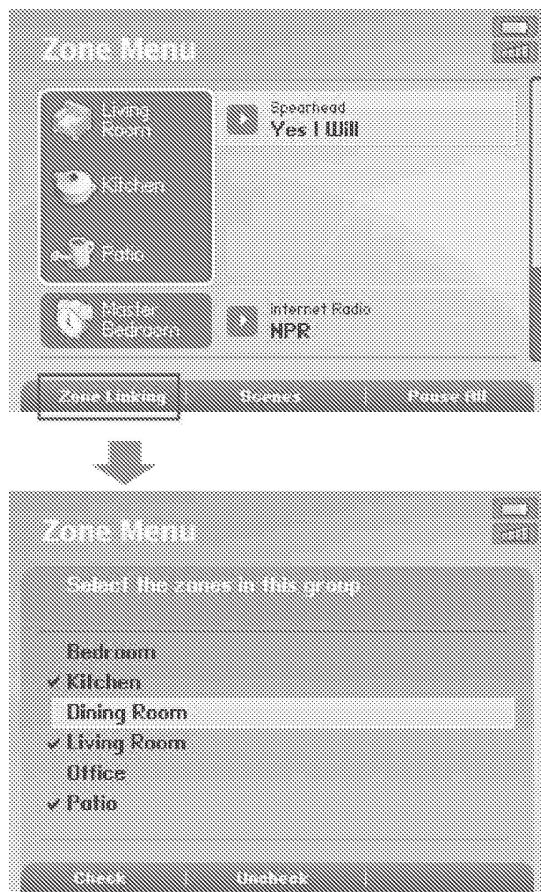
⁶ The 2019 amendment also added Figures 7 and 8 and their corresponding descriptions. Appx23005-23006; Appx23010; Appx32432-32433; Appx32437. Neither Google nor the district court ever suggested Figures 7 and 8 constituted new matter. *See* Appx100-101.

amendment “contains no new matter.” 37 C.F.R. § 1.57(g); *see also* 35 U.S.C. § 132(a).

That is precisely what Sonos did. Before 2019, the zone-scene specification incorporated by reference the 2006 provisional and 2007 non-provisional applications, making them “effectively part of the” specification as though “explicitly contained therein.” *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000). Then, in 2019, Sonos formally amended the zone-scene specification to bring certain parts of the 2006 provisional—including that one sentence—into the four corners of the document.

Sonos accurately represented to the examiner that all the inserted material “was previously incorporated by reference in this application, and the amendment contains no new matter.” Appx8701. The examiner had to independently verify that fact before approving the amendment. *See* Appx23023; Appx31846. The examiner’s approval is “entitled to an especially weighty presumption of correctness” in addition to the clear-and-convincing burden that already applies to any validity challenge. *Commonwealth*, 542 F.3d at 1380; *see supra* 50. The district court did not even acknowledge these heightened standards.

As Sonos explained to the examiner, the inserted sentence could “be found at least at pp. ... 17 of Appendix A” to the 2006 provisional application. Appx8724; Appx8736. That was true. Here is page 17 of Appendix A with the key sentence highlighted in blue:



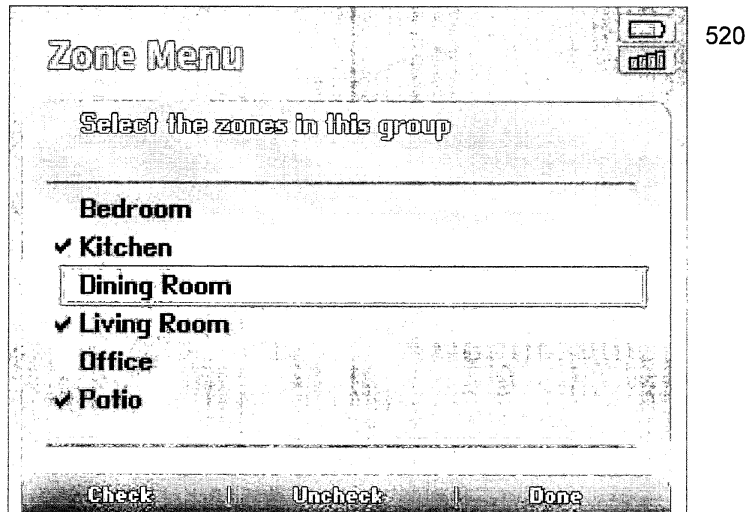
- The list of zones in the screen above includes ALL the zones in the system, including the Zones that are already grouped.

Appx8275. Compare that sentence with the one sentence Sonos added by amendment in 2019, shown in context, highlighted in blue:

[0062] FIG. 5B shows another user interface 520 to allow a user to form a scene. The user interface 520 that may be displayed on a controller or a computing device, lists available zones in a system. The list of zones in the user interface 520 includes ALL the zones in the system, including the zones that are already grouped. A checkbox is provide next to each of the zones so that a user may check in the zones to be associated with the scene.

Appx8711. The only difference between the two sentences appears in the following redline: “The list of zones in the ~~screen above~~ *user interface 520* includes ALL the zones in the system, including the zones that are already grouped.” That trivial change in wording had no substantive effect. It was merely a function of moving the image to the “Figures” section, where it became Figure 5B, which required referents (like “user interface 520”).

The court concluded that the 2019 amendment changed the meaning of the “ALL the zones” sentence because of its placement: Specifically, the court said it made a difference that Figure 5B (which appeared in the same form since the 2007 non-provisional) was “a truncated version” of the images in the 2006 provisional. Appx97. As shown above, the provisional displayed two images arranged vertically. But Figure 5B showed only the bottom half:

**FIG. 5B**

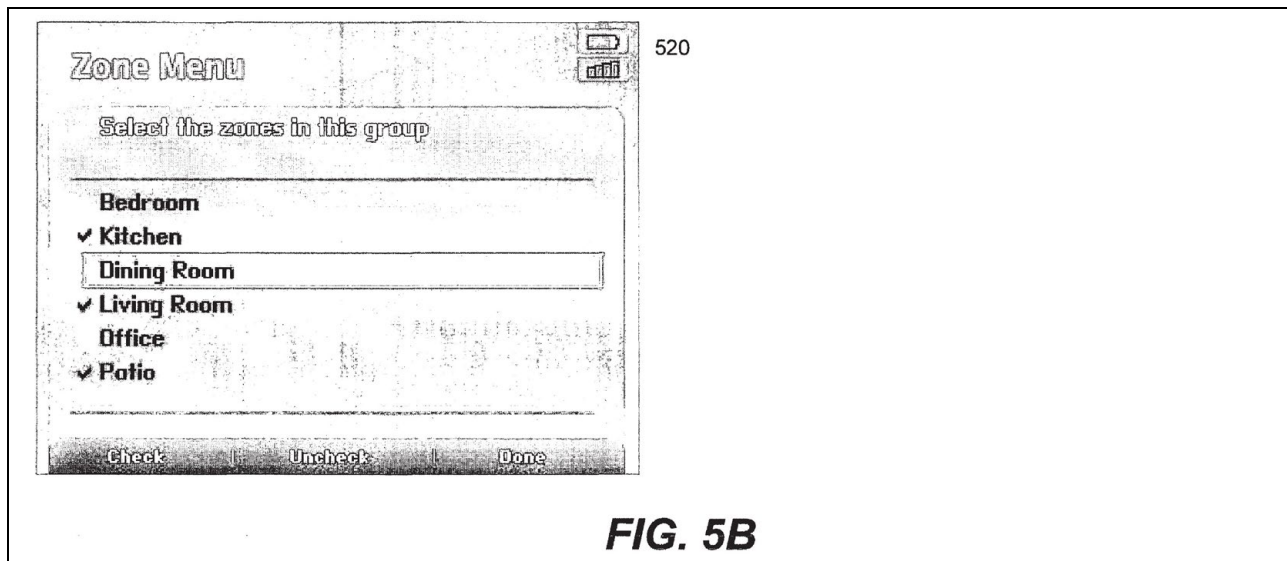
E.g., Appx2086. The district court held that depicting the two images together in the provisional illustrated a user interface that allowed for the creation of a dynamic, ad-hoc group of zone players, which is destroyed when the players are grouped differently or one of the players is used for individual playback. *See* Appx97-98. The court insisted (and improperly found as fact) that the two images together “had *nothing to do with zone scenes*.” Appx98. In contrast, the court found that Sonos “reappropriated” the “ALL the zones” sentence to “refer to zone scenes” by presenting it with only Figure 5B in the amendment. Appx98.

The court was wrong about both what the 2006 provisional showed and the effect of isolating the bottom image. As to the 2006 provisional, the appendix that includes the contested image is titled

“Sonos UI [User Interface] Specification: *Zone Scenes*.” Appx8275 (emphasis added). The court’s only basis for ignoring the title was that the image looks like the handheld controller for creating dynamic groups in Sonos’s 2005 system, and the appendix says elsewhere that “it [is] ‘not expected that the Zone Scenes should be set up using the Handheld Controller.’” Appx98 (quoting Appx8267). The court’s logic was wrong at every level. First, that sentence about what was “expected” appears nearly 10 pages earlier in a different subsection of the appendix. *Compare* Appx8267 (sentence in section 3) *with* Appx8275 (image in section 4). Second, just because it was “not expected that the Zone Scenes should be set up using the Handheld Controller” does not preclude embodiments where zone scenes are created that way. At a minimum, all these inferences are jury questions of how a skilled artisan would understand the provisional.

As to the purportedly truncated image, the district court erred in fixating on the 2006 provisional. The 2007 non-provisional application plainly supplies all the information that the district court found missing in 2006: It presented Figure 5B *in the exact same* (purportedly “truncated”) *form* as the zone-scene specification, and without any

ambiguity at all. And it explicitly described the figure, twice, as a user interface “to allow a user to form a [zone] scene” with a handheld controller—not as an interface for dynamically grouping zone players ad hoc:



“Brief Description of the Drawings”

[0025] FIG. 5B shows another user interface **520** to allow a user to form a scene;

“Detailed Description of the Preferred Embodiments”

[0060] FIG. 5B shows another user interface **520** to allow a user to form a scene. The user interface **520** that may be displayed on a controller or a computing device, lists available zones in a system. A checkbox is provide next to each of the zones so that a user may check in the zones to be associated with the scene.

Appx8363; Appx8336; Appx8348.

In short, the 2007 non-provisional application long ago disclosed that Figure 5B reflected zone scenes, not dynamic zone grouping. Each subsequent application in the patent family, including those for the '885 and '966 patents, incorporated the 2007 non-provisional by reference and included the disclosures above. Thus, the 2019 amendment did not change the meaning of this figure.

All of this preexisting support for overlapping zone scenes refutes the court's narrative that Sonos had to sneak in the "ALL the zones" sentence to shore up an otherwise inadequate written description. It thus reinforces the point, already evident from the prosecution history, that Sonos had no such motive. As noted above (at 59), Sonos filed claims to overlapping zone scenes *before* Sonos offered the amendment to the specification. Appx8682-8706; Appx8708-8729. The examiner was required to assess written-description support for overlapping zone scenes, *see* U.S. Patent & Trademark Office, Manual of Patent Examining Procedure § 2163 (9th ed. 2023), and found no inadequacy on that dimension. Appx27573-27583; Appx31521-31532 (obviousness rejections). In response to the obviousness rejection, Sonos amended its claims and distinguished the prior art. Simultaneously, Sonos

requested that the “ALL the zones” sentence be moved from the provisional into the specification itself. Appx8685-8686; Appx8701; Appx8711-8712; Appx8724. Since the examiner had already blessed the written description, Sonos had no reason to “strategically and deceptively add[] to the specification,” as the district court found. Appx99.

Why, then, did Sonos amend the specification? Sonos did so to conform the '885 and '966 specification with that of a parallel pending application in the same family (eventually yielding U.S. Patent No. 10,897,679), which had a different claim scope and for which Sonos had already amended the specification in the same way. *See* Appx8196-8199; Appx8232-8233; Appx8734-8736 ('679 application amendment). Sonos was following its general practice of maintaining maximum uniformity across specifications of co-pending applications within the same patent family. *See* Appx21194; Appx8663-8664 (Sonos contemporaneously making the same amendment to the specification of another pending application). This common strategy minimizes the human error that can arise when the specifications from the prior

generation of applications differ. There was nothing “deceptive[]” about this routine step in Sonos’s global prosecution practice.

If the court had properly applied the law, it would have reached the only possible conclusion: Google failed to overcome the “especially weighty presumption of correctness” that applies to an approved amendment, *Commonwealth*, 542 F.3d at 1380, and failed to prove invalidity by clear and convincing evidence, *Rivera*, 857 F.3d at 1319. At a minimum, it was improper for the court to draw factual inferences against Sonos.

C. This Court should reverse outright, or at a minimum order a limited retrial based on a full evidentiary record.

Reversal is required if this Court is persuaded that no reasonable factfinder could conclude that the priority date was later than 2007. But even if the Court concludes that Sonos merely created a dispute of fact as to these issues, reversal is still required. In fact, this Court may reverse on procedural grounds without even plodding through the written-description and priority-date issues, because the court violated at least two rules that are meant to ensure orderly and fair proceedings. These procedural errors, by themselves, require outright reversal.

In certain circumstances, a court is free to inject issues that no party has raised. But a court cannot inject an ultimately dispositive issue partway through trial *without* affording the parties an opportunity to develop and present evidence bearing on that issue. Rule 50(a)(1) protects litigants from precisely this kind of ambush. It prohibits the grant of JMOL against a party who has not “been fully heard on [the] issue during a jury trial.” Sonos was *not* fully heard on the written-description and priority-date issues; Sonos never had notice that the court would inject these issues midway through trial, let alone resolve them as a matter of law based on an undeveloped record. Had Sonos been on notice, it would have presented expert testimony showing, for example, how “one of skill in the art would understand” the prosecution history. *Commonwealth*, 542 F.3d at 1382; *see* Appx8227; Appx10518 (describing expert opinions and reports needed to defend against priority challenge).

Separately, under Rule 50, the district court did not have authority to enter JMOL on these issues. Even after the court alerted Google to its concerns—and ordered multiple rounds of briefing on them during the trial, *see supra* 19 n.3—Google never moved for JMOL under

Rules 50(a) and 50(b) on anticipation, priority date, or written description. Appx9727-9762; Appx9763-9785; Appx11099-11135. That constituted a complete forfeiture that not even the court could cure. *See Ortiz v. Jordan*, 562 U.S. 180, 189 (2011). “For the same reasons a party may not seek a JNOV [now JMOL] on grounds not alleged in their motion for directed verdict, a district court may not enter a JNOV on grounds not asserted in a party’s motion for directed verdict.” *Murphy v. City of Long Beach*, 914 F.2d 183, 186 (9th Cir. 1990); *see Santos-Arrieta v. Hosp. Del Maestro*, 14 F.4th 1, 9 (1st Cir. 2021) (collecting cases from multiple circuits holding the same).

Now is too late to fix these errors. Google failed to present these issues to the jury and thus forfeited them. Google failed to pursue the priority-date issue despite many opportunities, including: when its expert expressly noted the material added via the 2019 amendment, Appx10985; when it alleged “new matter” at the showdown without identifying any new matter, Appx4913-4914; when it offered no jury instructions on the priority date, Appx7000-7024; and when it sought JMOL only on other grounds, *supra* 69. Had the district court never raised the issue, Google would obviously not be entitled to a new trial

based on a defense that it first thought up during trial and never pressed until after an unfavorable verdict. The ordinary rules do not change just because the district court raised the issue on Google's behalf.

If, notwithstanding these fatal errors, this Court is inclined to let the parties address the disputed facts, and even if it believes that the district court's ruling is justified on the present record, it should remand for a retrial limited to the issues of priority date and written description. Sonos is entitled to an opportunity to develop relevant evidence and try the issues to a jury. If the jury reaches a verdict in Sonos's favor on those limited issues, the original verdict should be reinstated.

III. The District Court Improperly Resolved Disputed Facts In Invalidating The '615 And '033 Patents.

The district court followed the same pattern of usurping the jury's role when it invalidated the direct-control patents at summary judgment. Google argued that the asserted claims of the direct-control patents were obvious based on the combination of two prior art references: YouTube Remote and Google's '998 patent. The parties' experts offered dueling opinions on the validity of the direct-control

patents. Instead of presenting those issues to the jury, the court anointed itself fact-finder and resolved disputes in Google’s favor. This Court should vacate the judgments of invalidity so Sonos can try its case to a jury.

A. The district court improperly resolved a factual dispute over whether the prior art discloses a “device-picker.”

Both direct-control patents require what the parties call a “device-picker”: the ability to select a particular device from among the speakers connected to the smartphone and to transfer playback to that speaker. Claim 13 of the ’615 patent describes the device-picker as allowing “a selection of the particular playback device from the identified playback devices connected to the local area network.” Appx291 19:61-67. Claim 1 of the ’033 patent requires “displaying a representation of one or more playback devices” and “receiving user input indicating a selection of at least one given playback device from the one or more playback devices.” Appx322 17:43-52. Each claim further specifies that after the user makes her selection, playback transfers to the selected speaker(s).

No prior-art version of YouTube Remote contained a device-picker. The district court held, however, that “it would have been obvious to combine the YouTube Remote app system with disclosures in [the ’998 patent] to allow the selection of individual devices.” Appx14-17; Appx35-37. But the ’998 patent’s purported disclosure of a device-picker is ambiguous, so the district court improperly resolved a factual dispute over the scope of the prior art that should have gone to the jury.

The claims detail the computer-processing steps that allow the device-picker to display multiple available playback devices, receive a selection from a user of a particular playback device or devices from any that are available, and transfer playback to the selected device(s).

Supra 72. Google pointed to a single paragraph in the ’998 patent as disclosing all of this functionality. Appx4881-4882; Appx6337-6338. In full, Google’s paragraph says:

A user may use the remote control application of remote control 75, for example, to initiate contact with a server, such as server 24, for pairing remote control 75 to one or more controlled devices, such as controlled device 18 shown in FIG. 1. In some examples, the user may also utilize the remote control application of remote control 75 to *select one or more previously paired* controlled devices, and to send control messages to one or more paired controlled devices. For example, the user may interact with user interface 84

and/or display 88 to interact with and control any available controlled devices.

Appx34478-34479 10:62-11:6 (emphasis added).

Sonos argued that this passage “does not teach the selection of a particular ‘controlled device’ to transfer playback to.” Appx5085 (emphasis omitted). Instead, it “refer[s] to the ability to control any and all ‘controlled devices’ that have been ‘previously paired’ with a ‘remote control’ in a session, with no ability to choose from among[] those ‘controlled devices.’” Appx5085. In support, Sonos’s expert, Dr. Douglas Schmidt, testified that the passage is “ambiguous” and “not clear” as to whether it teaches the selection of a particular paired device from among multiple devices. Appx5149-5151. And even the ’998 patent’s inventor could not offer an opinion on what the passage discloses. Appx5190.

The district court recognized during the showdown hearing that it is unclear whether the paragraph discloses: (a) the ability to select a particular device from a set; or (b) only the ability to select any and all paired devices, no matter how many happen to be paired at the time. As the district court noted: “Now, that’s ambiguous.” Appx5317. “It says ‘select,’ but it doesn’t say select between the two.” Appx5320; *see*

Appx5318-5320. Google also conceded that the '998 patent does not mention any embodiments where the user selects or plays to only one device from a set of multiple paired devices. Appx5319.

Nonetheless, the district court found that the '998 patent “disclosed that a ‘user interface’ of a ‘remote control’ (*e.g.*, a smart phone) can display ‘previously paired controlled devices’ (*e.g.*, a television) so that a user may select and control ‘one or more paired controlled devices.’” Appx16. But aside from repeating the ambiguous phrase “one or more,” the court did not explain its finding. Instead, it called Dr. Schmidt’s interpretation “contorted” and declared: “The most straightforward reading of the passage is that it disclosed the ability to ‘select one or more’ devices among the ‘previously-paired devices.’” Appx16.

“Among” is the key word there, and it appears nowhere in the relevant part of the '998 patent. More importantly, it was inappropriate for the district court to decide which of two possible readings is “most straightforward.” Where dueling experts offered conflicting opinions on whether the '998 patent discloses the claimed device-picker, a reasonable jury could find that it does not. “[W]hat a reference teaches”

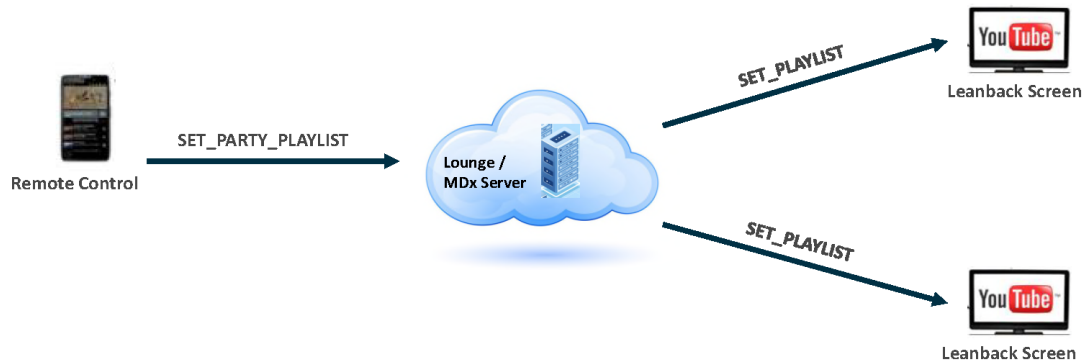
is a “question for the finder of fact,” so the court “improperly usurped the role of the jury” in choosing Google’s reading over Sonos’s. *Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1221 (Fed. Cir. 2003); *see also TriMed, Inc. v. Stryker Corp.*, 608 F.3d 1333, 1340-41 (Fed. Cir. 2010).

B. The district court improperly resolved a factual dispute over whether the playlist stored on a server in the prior art is a “remote playback queue.”

The ’033 patent’s asserted claims require “playback of a remote playback *queue provided by a cloud-based computing system* associated with a cloud-based media service.” *E.g.*, Appx322 17:39-42 (emphasis added). The invention proceeds in steps: (1) content is queued for playback; (2) a computing device (such as a phone) can handle playback of the remote queue at first; and (3) then the phone can transfer playback of the queue to a playback device (such as a smart speaker). Appx322 17:66-18:2. The district court construed “remote playback queue” as “a list of multimedia content selected for playback that is not local to the claimed computing device or playback device.” Appx26. And it held that YouTube Remote’s “party mode” functionality disclosed playback from such a queue because a cloud server “stored the list of

identifiers for the queue of videos selected for playback.” Appx30. But here, again, Sonos raised a factual dispute with testimony that party mode never involved playback from the cloud server; the cloud server merely stored a *copy* of the playlist, but a playback device or “screen” played only from its *local* playback queue. See Appx6425-6429.

Sonos’s expert explained that in party mode a “host [phone]” “sen[t] a copy of its entire local playback queue” in a “Set_Party_Playlist” message to the Lounge Server (Google’s name for the cloud server), which then sent a “Set_Playlist” message containing a copy of the playlist to any paired screen. Appx6463-6464. This Set_Playlist message contained videoIDs for the videos in the playlist. See Appx6458; Appx6464-6465. Each screen “save[d] a copy of the entire playlist into its local playback queue” and used that local queue “to playback the media items sent from the” phone. Appx6459; Appx6465.



Appx6862.

In this arrangement, the Lounge Server had only a copy of the party playlist, and the screens never “play[ed] back” any items from that copy. Appx322 17:64-65. Instead, they played back from their own local queues. By way of proof, Sonos’s expert explained that when a video ended, the screens automatically moved to the next video in the local queue instead of receiving more information from the Lounge Server about what to play next. Appx6465. Moreover, if the Lounge Server went offline, each screen continued playing from its local queue until it cycled through every item. Appx6465-6466.

Party mode thus did not involve playback of a “remote playback queue.” Even Google’s expert described this arrangement as using a local playback queue because “the playback device ... stores a list of videoIDs for the playlist and is thus capable of playing back the playlist

even if the [Lounge] server were not available.” Appx4718. He took that position for YouTube Remote’s non-party mode, Appx4717-4718, but his description of playback of a local queue applies equally to party mode.

The district court itself followed this exact logic in connection with the ’615 patent. The ’615 patent requires a *local* playback queue rather than a remote one, and the court invalidated the ’615 patent’s claim 13 as obvious partly because non-party mode played from a *local* playback queue (and because of the device-picker issue). Appx21; Appx11-17.

On the ’033 patent and party mode, the district court acknowledged that screens in party mode “all had and relied on their own local playback queues.” Appx29. But it disregarded Sonos’s expert’s opinion that screens in party mode never played content from the Lounge Server, as would be required to invalidate the ’033 patent. *See* Appx29-31. And it did not explain how it could conclude that party mode differed enough from non-party mode to warrant a finding of invalidity as a matter of law.

At bottom, the district court improperly resolved a factual dispute over whether the Lounge Server’s copy of the playlist was merely a

coordinating list that served to sync the local queue on a phone with the local queue on the screens, or whether the screens played from that list instead of their local queues. *See TriMed*, 608 F.3d at 1340-41.

CONCLUSION

This Court should reverse or vacate the judgment below and remand for further proceedings, including deciding the merits of the post-trial motions previously denied as moot.

February 12, 2024

George I. Lee
Sean M. Sullivan
Rory P. Shea
J. Dan Smith
Cole B. Richter
LEE SULLIVAN SHEA & SMITH LLP
656 W. Randolph St., Floor 5W
Chicago, IL 60661

Clement S. Roberts
Elizabeth R. Moulton
Sachi Schuricht
ORRICK, HERRINGTON &
SUTCLIFFE LLP
405 Howard Street
San Francisco, CA 94105

Respectfully submitted,

/s/ E. Joshua Rosenkranz

E. Joshua Rosenkranz
Joseph R. Kolker
ORRICK, HERRINGTON &
SUTCLIFFE LLP
51 West 52nd Street
New York, NY 10019
(212) 506-5000

Alyssa Caridis
Nicholas González
ORRICK, HERRINGTON &
SUTCLIFFE LLP
355 S. Grand Avenue, Suite 2700
Los Angeles, CA 90071

Lauren A. Weber
ORRICK, HERRINGTON &
SUTCLIFFE LLP
401 Union Street, Suite 3300
Seattle, WA 98101

Counsel for Appellant

ADDENDUM

Order Granting Motion for Partial Summary Judgment as to '615 Patent, Dkt. No. 316, filed August 2, 2022	Appx1
Order re Motions for Summary Judgment, Dkt. No. 566, filed April 13, 2023.....	Appx18
Order re Prosecution Laches and Post-Trial Motions, Dkt. No. 868, filed October 6, 2023	Appx51
Final Judgment, Dkt. No. 869, filed October 10, 2023	Appx106
Amended Final Judgment, Dkt. No. 880, filed November 14, 2023	Appx107
U.S. Patent No. 9,967,615.....	Appx265
U.S. Patent No. 10,779,033.....	Appx295
U.S. Patent No. 10,469,966.....	Appx346
U.S. Patent No. 10,848,885.....	Appx2051

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

GOOGLE LLC,

Plaintiff,

v.

SONOS, INC.,

Defendant.

No. C 20-06754 WHA

**ORDER GRANTING
MOTION FOR PARTIAL
SUMMARY JUDGMENT
AS TO '615 PATENT**

INTRODUCTION

In this patent infringement action, the accused infringer moves for summary judgment of non-infringement and invalidity of claim 13 of U.S. Patent No. 9,967,615. To the extent stated below, the motion is **GRANTED**.

STATEMENT

Patent owner Sonos, Inc. alleges that Google LLC's products infringe its patents, including United States Patent Nos. 10,848,885 and 9,967,615. Pursuant to our "patent showdown" procedure (Dkt. Nos. 68, 206), each side moves for summary judgment on one particular claim-in-suit. A separate order granted Sonos's motion for summary judgment of infringement as to claim 1 of the '885 patent and denied Google's corresponding motion of non-infringement (Dkt. No. 309). This order considers Google's motion for summary judgment of non-infringement and invalidity as to claim 13 of the '615 patent.

1 The technology at issue in this case generally concerns multi-room “smart” speaker
2 technology. Whereas the ’885 patent covers technology related to managing groups of smart
3 speakers, the ’615 patent relates to the act of transferring playback of music or other media
4 content from one device (*e.g.*, a smart phone) to another (*e.g.*, a smart speaker). In particular,
5 claim 13 of the ’615 patent is directed towards transferring playback of a *queue* of media
6 content (*e.g.*, a song playlist) from one device to another.

7 Some knowledge of pertinent terminology is helpful. Sonos accuses Google of infringing
8 by equipping “control devices” with certain apps that are capable of transferring media
9 playback to a “playback device.” Control devices are devices such as smart phones or tablets
10 that can install and control apps. Playback devices are devices such a smart speakers or
11 televisions that can play content. Google refers to the act of transferring playback from the
12 control device to the playback device as “casting.” The accused apps employ “cast”
13 technology that enables control devices to transfer media playback to a “cast-enabled”
14 playback device (Opp. 2).

15 The ability to transfer playback is useful because control devices are not necessarily ideal
16 for media playback. Smart phones, for example, have small screens and produce
17 unexceptional audio. Cast technology solves this problem by allowing users to transfer video
18 to external, larger screens and audio to external, higher-quality speakers.

19 Google Play Music, one of the accused apps, is illustrative. The app offers users a library
20 of songs to play. The details are disputed, but, generally, the app has access to information
21 about a song track currently being played, the tracks that were played previously, and the
22 tracks that are scheduled to play in the future. Such an arrangement of songs (or other content)
23 is commonly referred to as a “queue.” Among other purposes, the app’s access to the queue
24 allows users to skip forward to the next song or skip backward to the previous song.

25 If a Google Play Music user is disgruntled by the smart phone’s speaker and wants to
26 transfer audio playback to a smart speaker, the user can activate a feature on the app to cast
27 from the former to the latter. In addition to transferring playback of the current song, the smart
28 phone also transfers access to the *queue* of songs. Then, once playback has been transferred,

our user can control playback through the smart phone. Our user can, for example, skip to the next song in the queue, go back to the previous song in the queue, or shuffle the music in the queue, all while the music is playing on the smart speaker.

Sonos also accuses various of Google’s YouTube apps of infringing, including YouTube, YouTube Music, YouTube Kids, and YouTube TV. The YouTube apps work similarly to Google Play Music, except those apps allow *videos* (and accompanying audio) to be cast to another device such as a smart television. A user can, for example, install the YouTube app on a smart phone, play a YouTube video on the phone, and then cast the video, even midstream, to a cast-enabled television. The video would then play on the television, the television would have access to the queue of videos, and the user would be able to control playback through the phone.

Claim 13 of the ’615 patent is directed toward “systems, methods, apparatus, and articles of manufacture” to facilitate the transfer of playback from a “control device” to a “playback device” (’615 patent at Abstract). Using Google’s paragraph numbering, claim 13 of the ’615 patent recites:

13[pre]. A tangible, non-transitory computer readable storage medium including instructions for execution by a processor, the instructions, when executed, cause a control device to implement a method comprising:

13.1 causing a graphical interface to display a control interface including one or more transport controls to control playback by the control device;

13.2 after connecting to a local area network via a network interface, *identifying playback devices connected to the local area network;*

13.3 causing the graphical interface to display a selectable option for transferring playback from the control device;

13.4 detecting *a set of inputs to transfer playback from the control device to a particular playback device*, wherein the set of inputs comprises: (i) *a selection of the selectable option for transferring playback from the control device* and (ii) *a selection of the particular playback device from the identified playback devices connected to the local area network;*

13.5 after detecting the set of inputs to *transfer playback* from the control device to the *particular* playback device, causing playback to be transferred from the control device to the particular playback

device, wherein transferring playback from the control device to the particular playback device comprises:

(a) causing one or more first cloud servers to add multimedia content to a *local playback queue* on the particular playback device, wherein adding the multimedia content to the local playback queue comprises the one or more first cloud servers adding, to the local playback queue, one or more resource locators corresponding to respective locations of the multimedia content at one or more second cloud servers of a streaming content service;

(b) causing playback at the control device to be *stopped*; and

(c) modifying the one or more transport controls of the control interface to control playback by the playback device; and

13.6 causing the particular playback device to play back the multimedia content, wherein the particular playback device playing back the multimedia content comprises the particular playback device retrieving the multimedia content from one or more second cloud servers of a streaming content service and playing back the retrieved multimedia content.

The most contested terms are italicized. Sonos filed the application that led to the '615 patent in 2018, but the patent application claims priority through a chain of applications dating back to December 30, 2011. As detailed further below, the parties dispute the date of conception. Sonos asserts July 15, 2011, as the invention date.

Google argues that its products do not infringe element 13.5(a) because the accused apps employ a *remote* playback queue as opposed to a *local* playback queue. Google further contends that a 2010 version of the YouTube Remote app either anticipated claim 13 or, when combined with other references, rendered it obvious. This order follows full briefing and oral argument.

ANALYSIS

Summary judgment is proper when there is no genuine dispute of material fact and the moving party is entitled to judgment as a matter of law. FRCP 56(a). A genuine dispute of material fact is one that “might affect the outcome of the suit under the governing law.” *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 247–48 (1986). In deciding a motion for summary judgment, the court must accept the non-movant’s non-conclusory evidence and draw all justifiable inferences in its favor. *Id.* at 255.

1. NON-INFRINGEMENT.

This order starts with Google’s non-infringement arguments. Analysis of patent infringement requires a claim to be properly construed to determine its scope and meaning, which is then compared to the accused device or process. *See Tessera, Inc. v. Int’l Trade Comm’n*, 646 F.3d 1357, 1364 (Fed. Cir. 2011); *Carroll Touch, Inc. v. Electro Mech. Sys., Inc.*, 15 F.3d 1573, 1576 (Fed. Cir. 1993). Accordingly, this order will first construe the disputed term to determine claim 13’s scope and then proceed to assess whether the properly construed claim reads on Google’s accused products.

A. CONSTRUCTION OF “PLAYBACK QUEUE”

Sonos’s Proposed Construction	Google’s Proposed Construction	Court’s Construction
Plain and ordinary meaning	“An ordered list of multimedia items that is selected by the user for playback”	“A list of multimedia content selected for playback”

Claim terms generally take “their ordinary and customary meaning,” that is “the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). Although construction begins with the claim language itself, “*the specification is the single best*” — and usually dispositive — “guide to the meaning of a disputed term.” *Network-1 Techs., Inc. v. Hewlett-Packard Co.*, 981 F.3d 1015, 1022 (Fed. Cir. 2020) (quoting *Phillips*, 415 F.3d at 1314–15) (emphasis added).

Here, the only pertinent term in dispute is “playback queue.”¹ As explained above, part of claim 13 relates to transferring a queue of content from one device to another. The relevant portion of limitation 13.5 recites:

after detecting the set of inputs to transfer playback from the control device to the particular playback device, causing playback to be transferred from the control device to the particular playback device, wherein transferring playback from the control device to the

¹ The parties’ dispute over the term “resource locator” does not bear on this order’s infringement and invalidity analysis.

particular playback device comprises:

(a) causing one or more first cloud servers to add multimedia content to a *local playback queue* on the particular playback device. . .

(emphasis added). The parties fiercely dispute whether the accused products use a “local playback queue.” As detailed further below, Google’s cast technology currently manages content queues, broadly speaking, by storing such a queue on a *remote* cloud server on the internet. The parties refer to this remote queue as a cloud queue (*see, e.g.*, Br. 1). The parties agree that the cloud queue is not a “local playback queue,” as required by limitation 13.5(a), because it’s stored remotely on the internet as opposed to being stored locally on the playback device.

In order to play music or other content, however, a Google cast-enabled playback device receives some information from a cloud queue, which it subsequently stores locally. The details are disputed, but, as an example, a cast-enabled smart speaker might receive information from the cloud queue about the current song being played, the next song scheduled to play (in case the user wants to skip the next song), and the song that was played before (in case the user wants to go back to the previous song). This is the extent of what the smart speaker knows. The smart speaker won’t, for example, know about the next ten songs scheduled to play, or the ten songs that played before. That more extensive information is only stored in the cloud queue.

At stake here is whether the locally-stored information about the previous, current, and next song might *also* be a playback queue. If it is, then it could be the kind of “local playback queue” necessary to infringe. Sonos accordingly advocates against associating the term “playback queue” with any specific requirements, while Google wants a more definite construction to serve as the foundation for its non-infringement arguments. In particular, the parties dispute whether the term “playback queue” requires: (1) an “ordered list”; (2) plural “multimedia items”; and (3) user-selected media.

First, Sonos asserts that a “playback queue” need not be a list, but this argument does not conform with the intrinsic evidence. The patent repeatedly associates a queue with a “list” or

“playlist.” *See, e.g.,* ’615 patent at 15:57–67 (playback device may have information about “a current play position *within a list* to enable near-seamless ‘handoff’ of music from a portable device to a local playback system” (emphasis added)); 16:32–35 (devices may share “a current point of playback (e.g., now playing a third song in a playlist, fourth song in the playlist, and so on)”).

Sonos objects that “the ’615 Patent teaches embodiments where a ‘playback device’ queues a *single* resource locator, such as a URL. . . .” (Claim Constr. Br. 12). But a list of one is still a list. The patent cites a publication that states, for instance, that a “media *listing* can include . . . *one or more* additional items of media content.” *See* U.S. Patent App. Publ. 2012/0089910 A1 at ¶ 52 (emphasis added); *see also FitBit Inc. v. AliphCom*, 2017 WL 386257, at *14 (N.D. Cal. Jan. 27, 2017) (Judge Edward J. Davila) (“The ordinary meaning of ‘list’ also supports the idea that the ‘list’ at issue can contain one . . . item[.]. Lists often . . . contain only one item.”).

Second, Sonos argues that nothing requires a “playback queue” to contain plural multimedia items. This order agrees on that point. The plain language of the claim recites: “adding the multimedia content to the local playback queue comprises . . . adding, to the local playback queue, *one or more resource locators*” (*see* limitation 13.5(a) (emphasis added)). Google objects that a queue must include a “next” media item in case the user wants to skip forward, and accordingly argues that a queue logically must include at least two items (Br. 9 (citing Bhattacharjee Decl. ¶¶ 71–73)). But the patent does not have such a restrictive view of a queue. In addition to the claim language cited above, the specification repeatedly describes embodiments where a queue only contains a single audio track. *See, e.g.,* ’615 patent at 11:62–12:3 (a smart speaker “may contain a uniform resource locator . . . that specifies an address to *a particular audio track* in the cloud” (emphasis added)); *see also id.* at 10:42–46; 12:49–63; 13:36–40. These citations suggest that the list must contain at least one item, but not necessarily more than one.

Third, Sonos asserts that the content in the queue need not be selected directly by a user. Google’s position, by contrast, is that a user must directly populate and manage the queue (CC

Opp. 11). Google’s argument does not persuade. True, the specification discusses scenarios where a user adds or deletes content from the queue and suggests that a user *can* edit a queue (see, e.g., ’615 patent at 16:25–31 (describing a “queue that the user is editing/managing. . .”). However, the specification also repeatedly describes embodiments in which the third-party application (such as Google Play Music) dictates what media content is in the queue. See, e.g., ’615 patent at 13:1–10; 15:59–62. Moreover, as Sonos points out, nothing in the claim itself refers to a user.

In sum, this order agrees with Google that a “playback queue” requires a “list” of content selected for playback, but agrees with Sonos that the list does not necessarily require more than one item of content or require users to select content directly. This order further rejects Google’s proposal to include the term “multimedia item” in the construction. The claim uses the term “multimedia content,” and there is no need to introduce additional ambiguity by importing a new term. Accordingly, this order construes the term “playback queue” as “a list of multimedia content selected for playback.”

B. THE ACCUSED APPS DO NOT USE A “LOCAL PLAYBACK QUEUE”

Having construed “playback queue,” we now turn to Google’s non-infringement arguments. To prove infringement, Sonos must show that Google’s accused products meet each properly construed limitation of claim 13 either literally or under the doctrine of equivalents. See *Deering Precision Instruments, LLC v. Vector Distribution Sys., Inc.*, 347 F.3d 1314, 1324 (Fed. Cir. 2003). Here, Sonos asserts both. To establish literal infringement, all of the elements of the claim, as correctly construed, must be present in the accused products. *TechSearch, LLC v. Intel Corp.*, 286 F.3d 1360, 1371 (Fed. Cir. 2002). Sonos may also establish infringement under the doctrine of equivalents by “showing that the difference between the claimed invention and the accused product [is] insubstantial,” including “by showing on a limitation by limitation basis that the accused product performs substantially the same function in substantially the same way with substantially the same result as each claim limitation of the patented product.” *Crown Packaging Tech., Inc. v. Rexam Beverage Can Co.*, 559 F.3d 1308, 1312 (Fed. Cir. 2009).

1 As stated above, Google’s primary non-infringement theory is that both its Google Play
2 Music app and YouTube app products do not use a “local playback queue” (*see* limitation
3 13.5). The two categories of accused apps operate in slightly different ways. In plain Greek,
4 Sonos asserts that using the cast feature on the YouTube apps on a control device causes a
5 “WatchNext” server to transmit a “WatchNextResponse” to a cast-enabled playback device.
6 The WatchNextResponse is then stored by the playback device. According to Sonos, the
7 WatchNextResponse “often” includes a string of characters called a “videoId” that corresponds
8 to the item set to currently playback, the item set to playback next, and the item that came
9 before the current item (Opp. 3–5). Similarly, casting from the Google Play Music app on the
10 control device creates an ItemWindowResponse that stores a link to the previous, current, and
11 next media items set for playback (Opp. 7-8). The apps receive this information from a cloud
12 queue, and neither of the apps store any additional media content beyond those three items.

13 Google quibbles about some of the details. Google asserts, for example, that a playback
14 device only “request[s] cloud queue items one-by-one” (Br. 7). Google further states that the
15 “upNextVideoID” variable (*i.e.*, the variable corresponding to the item set to play next) only
16 appears when “the cloud queue has been exhausted,” and that this variable “only exists for a
17 few milliseconds” (Br. 9).

18 At bottom, though, neither side appears to dispute that Google’s products operate by
19 “retrieving” information from the cloud queue about the current, next, and previous media item
20 (Br. 9; Opp. 3). Nor do the parties dispute that these three items are only a subset of a separate
21 cloud queue. *The focus of the dispute is instead on whether this information stored locally in*
22 *the playback device is a playback queue at all.*

23 The parties dedicated the bulk of their briefing and their time at oral argument to this
24 issue. Upon review, this order concludes that neither the information stored by the
25 WatchNextResponse (in the YouTube apps) nor the information stored by the
26 ItemWindowResponse (in the Google Play Music app) qualify as a playback queue. The
27 groups of three items stored by the respective apps are not lists of multimedia content selected
28 for playback. In each app, the cloud queue stores the list, and the locally-stored information is

merely a mirror reflecting a subset of what is happening in the cloud queue. The songs set to play on Google Play Music, for example, are all dictated by the cloud queue. If the user adds or edits a playlist, the cloud queue changes. If the app creates a playlist, the cloud queue adapts. It is only *after* the cloud queue changes that anything can happen to the information stored locally on the playback device (*see* Bhattacharjee Decl. ¶¶ 81–84). This demonstrates that the groups of three items stored in each app are not lists of content selected for playback, but rather merely provide the means to *process* the lists for playback. In short, the cloud queue runs the show.

Sonos objects that multiple playback queues can exist simultaneously (Opp. 8). In support, Sonos points out that the specification teaches that there can be “two-way communication” between the local playback queue and a separate queue, “such as keeping a local playback queue synchronized with a queue that the user is editing/managing in the third party application” (’615 patent at 16:22–31). But there is no such “two-way communication” here. Rather, the cloud queue delivers information to the playback device on a one-way street. The cloud queue provides information about the queue to the WatchNextResponse and ItemWindowResponse, and never vice-versa, because there is no locally-stored queue that would allow “two-way” synchronization.

Sonos further objects that the specification teaches that “the local playback system” can “periodically fetch[] a short list of tracks to play list” from a “third-party application” (*id.* at 16:63–66). This passage, however, explains that the third-party application can “*override* a local playback queue” with the “short list of tracks to play next” (*ibid.*). The passage thus distinguishes a local playback queue from the “short list of tracks.” Moreover, the passage suggests that there must be something to override, and, here, the locally-stored information can never be populated by anything other than the “short list of tracks.” Instead, WatchNextResponse and ItemWindowResponse can never store additional or different items, and never more than three total items (*see* Bhattacharjee Decl. ¶¶ 21, 73, 119).

Sonos has accordingly failed to raise a genuine dispute that Google’s products employ a “local playback queue” as contemplated by claim 13 of the ’615 patent. Thus, Google’s

products do not infringe the claim, and this order need not address Google’s additional non-infringement arguments.

2. ANTICIPATION AND OBVIOUSNESS.

This order now turns to Google’s invalidity arguments. Before we move forward, however, a procedural note. After Google filed its motion, Sonos moved to strike some of the motion for improperly asserting new invalidity theories and prior art references. A prior order granted Sonos’s motion in part, striking paragraphs 133 and 138–41 of Dr. Bhattacharjee’s expert report in their entirety (Dkt. No. 315). That material is accordingly not considered here.

With this in mind, we now turn to Google’s surviving arguments. Google asserts that one of its previous apps, the YouTube Remote app, anticipated claim 13 of the ’615 patent. Alternatively, Google argues that it would have been obvious to combine the YouTube Remote app with other prior art references to achieve Sonos’s claimed invention.

The YouTube Remote app was released in November 2010 (*see* Bobohalma Decl. ¶ 3). The purpose of the app was to allow a smart phone to connect to another device, such as a television or computer, so that a YouTube video being played on the smart phone would appear on a larger screen (Br. 16). For example, a user could mirror a YouTube video onto a television and control playback of the video through the app. In short, the app functioned similarly to what Google now calls casting, as described above. The old process was more cumbersome, however, because it involved an intermediary website to which both devices separately had to connect to enable pairing. Specifically, each device needed to separately navigate to the intermediary website and log in to the same YouTube account. Once the devices were logged in to the same account, they could then pair with each other through the YouTube Remote app (*see* Opp. 14–15).

Google now asserts that the app disclosed each and every limitation of claim 13. “Anticipation requires that a single prior art reference disclose each and every limitation of the claimed invention, either expressly or inherently.” *SRI Int’l Inc. v. Cisco Sys., Inc.*, 930 F.3d 1295, 1306 (Fed. Cir. 2019). “Anticipation is a question of fact.” *Atlas Powder Co. v. Ireco, Inc.*, 190 F.3d 1342, 1346 (Fed. Cir. 1999). Because a patent is presumed valid, the party

asserting invalidity has the burden of proof to show anticipation by clear and convincing evidence. *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356, 1364 (Fed. Cir. 2018).

Sonos replies that the YouTube remote app did not disclose claim limitations 13.2, 13.4, 13.5, and 13.6.² This order will first consider Sonos's arguments as to 13.2, 13.5, and 13.6, and then circle back to 13.4. For the reasons that follow, this order concludes that the app did not disclose limitation 13.4, but that modifying the app to satisfy the limitation would have been obvious in light of the prior art.

A. ***LIMITATION 13.2***

Claim limitation 13.2 recites "after connecting to a local area network via a network interface, identifying playback devices connected to the local area network." For our purposes, a "local area network," or LAN, refers to a "local" home Wi-Fi network. This is in contrast to a "wide area network," or WAN, which refers to network that can be accessed more widely, *e.g.*, a 3G cellular network. The important point is that a LAN and a WAN provide different means to connect a device to the internet.

Sonos reads limitation 13.2 to require that the control device affirmatively identify that the playback device is *connected to the same LAN* as the control device, as opposed to a WAN or a different LAN (Opp. 15). Google admits that its system did not do this. Instead, the system allowed the control device and the playback device to separately log in to the intermediary website. As such, it didn't matter whether the smart phone and television were connected to the internet in different ways. For example, the smart phone could have used a 3G network (a WAN) to navigate to the intermediary website, while the television could have used a home Wi-Fi network (a LAN) to navigate to the intermediary website. Thus, the YouTube Remote system did not require the control device to know whether the television was connected to a LAN at all. Sonos insists that this precludes anticipation.

² Sonos briefly argues that Google has not met its burden to show anticipation as to limitations 13.1 and 13.3 (Opp. 14). But Google stated in its motion that, according to Sonos's validity contentions, there was no dispute as those limitations (*see* Br. 17–18). Sonos said nothing to the contrary in its opposition brief.

Google objects that the plain language of the claim does not require any such identifying of the LAN. This order agrees. The claim only requires the control device to “identify[] playback devices connected to the local area network” (*see* limitation 13.2). The phrase “connected to the local area network” modifies “playback devices.” Accordingly, the claim does not require affirmatively identifying the LAN. Nor does it require identifying *that* the television is connected to the LAN. All that is required is that the system allowed (i) playback devices to be identified and (ii) such identified devices to be connected to the same LAN as the control device.

The YouTube Remote system allowed both. It is undisputed that a television, for example, could have been connected to the same home Wi-Fi network as the smart phone, and that the smart phone could have transferred playback to that television. Indeed, Google has provided a 2010 video demonstrating just that (*see* Reply Br. 10).³ In such circumstances, the control device is “identifying playback devices connected to the [LAN]” (*see* limitation 13.2). True, as Google acknowledges, the phone and the television could have been connected to the internet in different ways, but that Google’s system could identify devices connected to the LAN in some circumstances *and* devices not connected to the LAN in others does not preclude anticipation. Rather, it shows that Google’s system was flexible and had capabilities in addition to those recited by the claim. *See Vulcan Eng’g Co. v. Fata Aluminium, Inc.*, 278 F.3d 1366, 1375 (Fed. Cir. 2002) (“It is irrelevant whether an element has capabilities in addition to that stated in the claim.”). Accordingly, the YouTube Remote app system tracked limitation 13.2.

B. LIMITATIONS 13.5–13.6

Next, Sonos briefly argues that the YouTube Remote system did not disclose limitation 13.5 because the app did not “caus[e] the playback at the control device to be *stopped*” (Opp. 18). Instead, Sonos contends, the smart phone in the 2010 video proffered by Google “appears to still be in a playback state (albeit paused). . . .” (*ibid.*). Sonos, however, does not elaborate

³ Citing *How to Control Google TV or YouTube Leanback with YouTube Remote*, YouTube (Nov. 14, 2010), available at <https://youtu.be/EGdsOslqG2s?t=56> (last visited July 29, 2022).

as to the distinction between playback being “paused” and “stopped,” and presents no evidence that there is any difference between the two. Absent such, this order concludes that they mean the same thing. Thus, the YouTube Remote app tracked limitation 13.5 to that extent.

Sonos goes on to argue that Google has failed to show disclosure as to both limitations 13.5 and 13.6 because Google’s arguments as to those limitations rely on an “‘API’ document and/or source code” that is dated July 12, 2010. The version of the YouTube Remote system that Google asserts as anticipating prior art is dated November 9, 2010. To link the API document with the later version of the YouTube Remote app, Google provided a declaration from an engineer who did not work at Google until July 2011, a year after the date ascribed to the API document (Reply Br. 18; Levai Decl. ¶¶ 2, 9). Sonos asserts that such “an uncorroborated 2022 declaration of an interested witness . . . who did not even work at Google” at the time “is insufficient corroboration” (Opp. 18). Not so. The engineer, Janos Levai, worked on the prior art product shortly after the relevant time period and then worked on subsequent iterations of the product for five years (*see* Levai Decl. ¶¶ 2, 9). He can testify about how the app worked. Consequently, Sonos has failed to show a genuine dispute as to limitations 13.5 and 13.6.

C. *LIMITATION 13.4*

We now circle back to limitation 13.4, which is our only remaining disputed limitation. That limitation recites a “set of inputs” that comprise “(i) a selection of the selectable option for transferring playback from the control device and (ii) a selection of the particular playback device from the identified playback devices connected to the local area network.” The YouTube Remote app offered the user the option to select a “Connect” button to transfer playback from the smart phone to the playback devices available for pairing (Br. 19; Opp. 16–17). Sonos does not dispute that a selection of “Connect” was “a selection of the selectable option for transferring playback from the control device” (Opp. 17). Sonos contends, however, that the app did not allow the selection of a “*particular* playback device from the identified playback devices connected to the local area network” (*ibid.*). In other words, Sonos asserts that, in the event multiple devices were available for playback (*e.g.*, multiple televisions), the

1 user had no ability to select a subset of those devices for playback. The user was instead
2 forced to transfer playback to *all* available devices (Schmidt Decl. ¶ 154).

3 In reply, Google points to YouTube Remote source code dated December 1, 2011 —
4 which pre-dates the '615 patent's claimed priority date of December 30, 2011 — that it asserts
5 allowed users to select particular devices (Reply Br. 11–12 (citing Bhattacharjee Decl. ¶
6 170)). Sonos does not dispute the substance of the code, but contends that it is not prior art
7 because its own asserted priority date is July 15, 2011 (*see, e.g.*, Opp. 18 n.8). Sonos further
8 asserts that Google never contested this earlier invention date in its motion. Google replies that
9 it stated in its invalidity contentions that it was Sonos's burden to show the earlier priority date,
10 and that it was only using the July 15 date to frame its arguments (Reply Br. 12).

11 This order sides with Sonos here. Google acknowledged the July 15 date in its opening
12 motion (*see* Br. 19 n.8). Further, Google's motion only discusses the December 1, 2011,
13 source code in the context of its obviousness argument (*see* Bhattacharjee Decl. ¶ 170). Taken
14 together, this shows that Google treated July 15 as the applicable priority date. If Google
15 wanted to rely on the December 1 source code for its anticipation argument, it should have
16 made that clear in its opening motion. Instead, Google engaged in a bait-and-switch in its
17 reply brief (*compare* Br. 19–20, *with* Reply Br. 11–12). Thus, Google cannot now rely on the
18 December 1, 2011, source code for its anticipation case. The YouTube Remote system,
19 consequently, did not disclose limitation 13.4 because Google has failed to show that it
20 allowed users to select a “particular playback device.”

21 Nevertheless, this order concludes that it would have been obvious to combine the
22 YouTube Remote app system with disclosures in United States Patent No. 9,490,998 to allow
23 the selection of individual devices.

24 A claimed invention is obvious if “the differences between the subject matter sought to
25 be patented and the prior art are such that the subject matter as a whole would have been
26 obvious at the time the invention was made to a person having ordinary skill in the art.” 35
27 U.S.C. § 103(a) (pre-AIA). Unlike anticipation, which “requires all elements of a claim to be
28 disclosed within a single reference,” “[o]bviousness can be proven by combining existing prior

art references” to disclose all the elements of a claim. *Cohesive Techs. Inc. v. Waters Corp.*, 543 F.3d 1351, 1364 (Fed. Cir. 2008).

The ’998 patent is prior art. It was filed on March 7, 2011, and claims priority to an earlier provision application filed in November 2010. The patent’s inventors were involved with the development of the YouTube Remote system, and the patent relates to controlling playback on a playback device through a control device. The ’998 patent disclosed that

[i]n some examples, the user may also utilize the remote control application of remote control 75 to *select one or more previously paired controlled devices*, and to send control messages to one or more paired controlled devices. For example, the user may interact with user interface 84 and/or display 88 to interact with and control any available controlled devices.

(see ’998 patent at 10:62–11:6 (emphasis added)). Thus, the patent disclosed that a “user interface” of a “remote control” (e.g., a smart phone) can display “previously paired controlled devices” (e.g., a television) so that a user may select and control “one or more paired controlled devices” (*ibid.*) The patent, therefore, taught the “selection of the particular playback device from the identified playback devices” as contemplated by the ’615 patent.

Sonos raises three objections to this conclusion. *First*, Sonos argues that the passage is ambiguous insofar as it could be read to refer to

the ability to control one “controlled device,” if that is the only “previously paired” “controlled device,” or the ability to control all “controlled devices” collectively, if multiple “controlled devices” have been “previously paired” with a “remote control” in a session

(see Schmidt Decl. ¶ 173). Put differently, Sonos does not read the passage to teach the selection of a particular device when multiple devices are connected in a session. This contorted interpretation does not convince. The most straightforward reading of the passage is that it disclosed the ability to “select one or more” devices among the “previously-paired devices.”

Second, Sonos argues that the passage does not “mention or even suggest[] *transferring* playback from a ‘remote control’ to a ‘controlled device’” and “[c]onsequently . . . does not teach the selection of a particular ‘controlled device’ to *transfer* playback to” (Opp. 19). This is missing the forest for the trees. As described above, the YouTube Remote app system,

which is prior art, disclosed the transfer of playback. The passage from the '998 patent disclosed the selection of a particular device. They achieve the claim together.

Third, Sonos argues that it would not have been obvious to combine the '998 patent's disclosure with the YouTube Remote system. Specifically, Sonos argues that the YouTube Remote "system architecture" both "teaches away from Google's proposed modifications and also renders such modifications more complicated than Google posits" (Opp. 21–22). Sonos further argues that there would have been no motivation to integrate the modification because it "was not even a prominent feature" of the YouTube Remote app (*id.* at 22). The problem with these assertions is that Google produced source code achieving the proposed modification just a few months after Sonos's asserted priority date, and Google then released the functionality to the public a year later (*see* Reply Br. 14). This adequately demonstrates that a person of skill in art would have been motivated to add the feature.

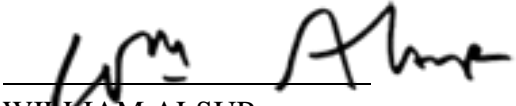
Sonos's remaining snippets of argument are conclusory and without merit. In sum, this order finds that it would have been obvious to combine the teachings of the '998 patent with the YouTube Remote system to achieve the claimed invention. Google's motion for summary judgment of invalidity of claim 13 of the '615 patent is accordingly **GRANTED**.

CONCLUSION

To the foregoing extent, Google's motion for summary judgment is **GRANTED**.

IT IS SO ORDERED.

Dated: August 2, 2022.



WILLIAM ALSUP
UNITED STATES DISTRICT
JUDGE

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SONOS, INC.,

Plaintiff,

No. C 20-06754 WHA

v.

GOOGLE LLC,

Defendant.

**ORDER RE MOTIONS FOR
SUMMARY JUDGMENT****INTRODUCTION**

With trial looming in this patent infringement action, both sides again move for summary judgment. Alleged infringer now moves for summary judgment of invalidity and no willful or indirect infringement of the three remaining patents, as well as non-infringement of two of those patents based on a purported design-around. Meanwhile, patent owner now moves for summary judgment on alleged infringer's contract-based claims. For the following reasons, alleged infringer's motion is **GRANTED IN PART, DENIED IN PART**, and **DEFERRED IN PART**, whereas patent owner's motion is **DENIED AS MOOT**.

STATEMENT

The relevant facts are described at length elsewhere. *See Sonos, Inc. v. Google LLC*, 591 F. Supp. 3d 638, 641 (N.D. Cal. 2022), *leave to appeal denied*, 2022 WL 1486359 (Fed. Cir. May 11, 2022). In brief, we have two related civil actions involving Sonos, Inc.'s patents and Google LLC's alleged infringement: Google's declaratory judgment action filed in the

1 Northern District of California, and Sonos’s affirmative infringement action filed (one day
2 before) in the Western District of Texas and transferred (one year later) at the direction of the
3 Federal Circuit (No. C 21-07559 WHA).

4 The operative pleadings focus on U.S. Patent Nos. 9,967,615; 10,779,033; 10,848,885;
5 and 10,469,966. These patents generally concern multi-room “smart” speaker technology.
6 Whereas the ’615 and ’033 patents cover technology related to transferring playback between
7 devices, *i.e.*, “casting,” the ’885 and ’966 patents cover technology related to managing groups
8 of smart speakers.

9 Pursuant to “patent showdown” procedure, each side has already moved for summary
10 judgment on a single claim. Separate orders granted summary judgment in favor of Google on
11 invalidity of claim 13 of the ’615 patent and in favor of Sonos on infringement of claim 1 of
12 the ’885 patent. Sonos has since withdrawn its remaining claims based on the ’615 patent, and
13 Google has since begun developing and deploying a purported design-around for the ’885 and
14 ’966 patents. Claims and defenses related to the ’033, ’885, and ’966 patents are now set for
15 trial starting May 8, 2023 (SAC ¶¶ 49–84; *see also* No. C 21-07559 WHA, TAC ¶¶ 134–233).
16 So are Google’s claims for breach of contract and conversion, which are based on prior
17 collaborations with Sonos (SAC ¶¶ 85–97).

18 In the lead-up to trial, both parties have filed motions to strike portions of each other’s
19 expert reports (Dkt. Nos. 464, 469), as well as new motions for summary judgment (Dkt. Nos.
20 478, 483). Sonos also filed a renewed motion to realign the parties (Dkt. No. 477), which the
21 undersigned granted at the hearing after Google withdrew its opposition (Dkt. No. 557). A
22 companion order considered the motions to strike (Dkt. No. 565). This order considers the
23 motions for summary judgment.

24 Google moves for summary judgment of invalidity of the asserted claims of the ’033,
25 ’885, and ’966 patents; no willful or indirect infringement of the asserted claims of the ’033,
26 ’885, and ’966 patents; and non-infringement of the asserted claims of the ’885 and ’966
27 patents based on a purported design-around. Sonos moves for summary judgment on Google’s
28 breach of contract and conversion claims. This order follows full briefing and oral argument.

ANALYSIS

Under Rule 56 of the Federal Rules of Civil Procedure, summary judgment is proper when there is no genuine dispute of material fact and the movant is entitled to judgment as a matter of law. A dispute of material fact is genuine “if the evidence is such that a reasonable jury could return a verdict for the nonmoving party.” *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986). In deciding a motion for summary judgment, the district court must accept the non-movant’s non-conclusory evidence and draw all justifiable inferences in the non-movant’s favor. *Id.* at 255.

1. GOOGLE’S MOTION: INVALIDITY OF THE ’033 PATENT.

Let’s begin with the ’033 patent. Our analysis of the ’033 patent (“Systems and Methods for Networked Music Playback”) starts with our earlier analysis of the ’615 patent (“Networked Music Playback”) during the patent showdown. *Google LLC v. Sonos, Inc.*, 2022 WL 3046752 (N.D. Cal. Aug. 2, 2022). They have identical specifications. Like the ’615 patent, the ’033 patent is directed toward the act of transferring playback of media content from one device (*e.g.*, a phone) to another (*e.g.*, a television), an act Google calls “casting.” And, like claim 13 of the ’615 patent covered in the prior order, the asserted claims of the ’033 patent covered here are directed toward transferring playback of a queue of media content (*e.g.*, a video playlist).

This order refers the reader to the prior order for a more in-depth introduction to cast technology and the accused applications, which include YouTube, YouTube Kids, YouTube TV, YouTube Music, and Google Play Music. Suffice to say, YouTube was and remains owned by Google, and the accused applications employ technology that enables a “control device” to transfer playback of a queue of media content to a Google cast-enabled “playback device,” wherein the control device controls the application and the playback device plays the content. By way of example, a user can activate a feature on the accused YouTube application to cast a video playlist (queue of media content) from a phone (control device) to a television (playback device). The analysis of the ’615 patent in the prior order, and the analysis of the ’033 patent in this order, hinge on the queue of media content that is cast. Because both parties

1 find support in the prior order’s analysis of non-infringement and invalidity, this order will
2 provide a summary.

3 *First*, the prior order found Google’s accused products did not infringe claim 13 of the
4 ’615 patent because they did not employ a “local playback queue on the particular playback
5 device,” as required by limitation 13.5 (’615 patent 20:8–9). That order construed “playback
6 queue” as “a list of multimedia content selected for playback.” It then determined that the
7 information in the accused applications that was stored locally on Google cast-enabled
8 playback devices to play casted content (*i.e.*, last, current, and next media item) was *not* a
9 playback queue. Rather, that information was a subset of the list of multimedia content
10 selected for playback and merely provided the local means to process it. For the accused
11 products, the list of multimedia content selected for playback was stored on a remote cloud
12 server. The parties and the prior order referred to it as a “cloud queue,” and all agreed that it
13 was not a local playback queue because it was not stored locally on a playback device in the
14 accused applications. The parties only disputed whether the information received by a Google
15 cast-enabled playback device *from* the cloud queue was *itself* a local playback queue. The
16 prior order found it was not. “In short, the cloud queue r[an] the show.” *Google*, 2022 WL
17 3046752, at *6; *see generally id.* at *3–6.

18 *Second*, that order found claim 13 of the ’615 patent invalid over prior art. Specifically,
19 it determined that Google’s YouTube Remote application anticipated claim 13 of the ’615
20 patent for all but one limitation. This was limitation 13.4, which required “selection of [a]
21 particular playback device” (’615 patent 19:61–67). But the prior order nevertheless
22 concluded it would have been obvious to combine the YouTube Remote application with
23 disclosures in a Google patent to allow for such selection (U.S. Patent No. 9,490,998). Note
24 that the order did not discuss the local playback queue from limitation 13.5 in the context of
25 invalidity; it only discussed it in the context of non-infringement, as set out above. By
26 implication, however, the prior order found the YouTube Remote application employed a local
27 playback queue because it found the YouTube Remote application disclosed limitation 13.5.
28 *Google*, 2022 WL 3046752, at *6–10.

Whereas claim 13 of the '615 patent recited a “local playback queue on the particular playback device,” the corresponding claims of the '033 patent recite a “remote playback queue provided by a cloud-based computing system.” The parties agree that this is the central distinction between the two patents, but they disagree on the significance of this distinction.

A. NO JUDICIAL ESTOPPEL.

As a threshold matter, this order will consider (and reject) Sonos’s argument that Google is judicially estopped from asserting the YouTube Remote prior art disclosed the '033 patent’s remote playback queue. According to Sonos, Google previously represented that the YouTube Remote system “used a *local* playback queue, and further argued that there can only be one playback queue in a system” (Sonos Opp. 2) (emphasis in original). It insists that the undersigned relied on these representations in finding claim 13 of the '615 patent invalid. According to Google, however, neither it nor the undersigned ever suggested that there could only be one playback queue in the YouTube Remote system (Google Reply Br. 1–3). This order agrees with Google.

“[W]here a party assumes a certain position in a legal proceeding, and succeeds in maintaining that position, he may not thereafter, simply because his interests have changed, assume a contrary position, especially if it be to prejudice the party who has acquiesced in the position formerly taken by him.” *New Hampshire v. Maine*, 532 U.S. 742, 749 (2001) (citation omitted). Google has not assumed a contrary position here. The language Sonos seizes upon from Google’s prior motion for summary judgment stated:

[T]he YouTube Remote prior art product is a direct ancestor of the YouTube product Sonos accuses of infringement The key difference is that where the accused YouTube applications use . . . a cloud queue, the prior art YouTube Remote used . . . a local queue.

(Sonos Opp. 2 (quoting Google Showdown Br. 2)) (emphasis omitted). Just because the accused applications use a cloud queue where the YouTube Remote prior art used a local queue does not mean that the YouTube Remote prior art could not also use a remote playback queue. Google’s expert expressly rejected that position in his patent showdown rebuttal report, observing “[a] system might store the playback queue both at the local playback device and

remotely,” but “[t]his [was] not the case with *the accused products*” (Bhattacharjee Showdown Rebuttal Rpt. ¶ 320) (emphasis added). Google’s expert did not rule out this possibility for the prior art.

Neither did the prior order, which stated:

Sonos objects that multiple playback queues can exist simultaneously (Opp. 8). In support, Sonos points out that the specification teaches that there can be “two-way communication” between the local playback queue and a separate queue, “such as keeping a local playback queue synchronized with a queue that the user is editing/managing in the third party application” (’615 patent at 16:22–31). But there is no such “two-way communication” here. Rather, the cloud queue delivers information to the playback device on a one-way street. The cloud queue provides information about the queue . . . and never vice-versa, because there is no locally-stored queue that would allow “two-way” synchronization.

Google, 2022 WL 3046752, at *6. In other words, that order only found the “two-way” playback queue of one embodiment did not exist in the accused products. It never concluded that multiple playback queues could not exist simultaneously or could not have existed simultaneously in the prior art.

Moreover, Google now argues that a feature in YouTube Remote *version 2* (“YTR2”) disclosed a remote playback queue, whereas it was YouTube Remote *version 1* (“YTR1”) that disclosed a local playback queue previously. This alone suggests that the prior order should not foreclose an invalidity analysis here. Whereas YTR1 was released on November 9, 2010, YTR2.03 and YTR2.07 were released on July 29, 2011, and August 10, 2011, respectively. The ’033 patent application claims priority through a chain of applications dating back to December 30, 2011. Because the YTR2 system was released prior to the ’033 patent priority date and could invalidate the asserted claims, this order proceeds to analysis of those claims.

B. OVERVIEW OF ASSERTED CLAIMS.

Sonos asserts claims 1–2, 4, 9, 11–13, and 16 of the ’033 patent. Claims 1 and 12 are independent claims, and claims 2, 4, 9, 11, 13, and 16 are dependent claims. Whereas claim 1 is directed to a “computing device” (corresponding to a control device discussed above), claim

12 is directed to a “computer-readable medium” (with instructions for that control device).

Both parties focus their analysis on claim 1.

Using Google’s paragraph numbering, claim 1 of the ’033 patent recites:

[1.0] A computing device comprising:

[1.1] at least one processor;

[1.2] a non-transitory computer-readable medium; and

[1.3] program instructions stored on the non-transitory computer-readable medium that, when executed by the at least one processor, cause the computing device to perform functions comprising:

[1.4] operating in a first mode in which the computing device is configured for playback of a *remote playback queue* provided by a cloud-based computing system associated with a cloud-based media service;

[1.5] while operating in the first mode, displaying a representation of one or more playback devices in a media playback system that are each i) communicatively coupled to the computing device over a data network and ii) available to accept playback responsibility for the *remote playback queue*;

[1.6] while displaying the representation of the one or more playback devices, receiving user input indicating a selection of at least one given playback device from the one or more playback devices;

[1.7] based on receiving the user input,

[1.7(a)] transmitting an instruction for the at least one given playback device to take over responsibility for playback of the *remote playback queue* from the computing device,

[1.7(b)] wherein the instruction configures the at least one given playback device to (i) communicate with the cloud-based computing system in order to obtain data identifying a next one or more media items that are in the remote playback queue, (ii) use the obtained data to retrieve at least one media item in the *remote playback queue* from the cloud-based media service; and (iii) play back the retrieved at least one media item;

[1.8] detecting an indication that playback responsibility for the *remote playback queue* has been successfully transferred from the computing device to the at least one given playback device; and

[1.9] after detecting the indication, transitioning from i) the first mode in which the computing device is configured for playback of the *remote playback queue* to ii) a second mode in which the computing device is configured to control the at least one given playback device's playback of the *remote playback queue* and the computing device is no longer configured for playback of the *remote playback queue*.

(’033 patent 17:32–18:10). Recall the parties agree that the primary difference between invalid claim 13 of the ’615 patent and the asserted claims of the ’033 patent is that the former recited a local playback queue and the latter recite a remote playback queue, italicized above.

Google now argues that claim 1 of the ’033 patent and the other asserted claims are invalid as obvious over two prior art references: (1) Google’s YTR2 system, which disclosed a remote playback queue on account of its “party mode” feature; and (2) Google’s ’998 patent, which (again) taught the selection of playback devices (Google Br. 5–15). Sonos contends that these prior art references did not satisfy limitations 1.4–1.9 of the ’033 patent (Sonos Opp. 3–10). According to Sonos, the YTR2 system did not disclose a remote playback queue, as required by limitations 1.4, 1.7, 1.8, and 1.9, whereas the ’998 patent did not teach the selection of playback devices, as required by limitations 1.5 and 1.6.¹

A claimed invention is obvious if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art.” 35 U.S.C. § 103(a) (pre-AIA). Obviousness is a question of law based on underlying questions of fact. *ABT Sys., LLC v. Emerson Elec. Co.*, 797 F.3d 1350, 1354 (Fed. Cir. 2015). Unlike anticipation, which “requires all elements of a claim to be disclosed within a single reference,” “[o]bviousness can be proven by combining existing prior art references.” *Cohesive Techs. Inc. v. Waters Corp.*, 543 F.3d 1351, 1364 (Fed. Cir. 2008). “A party seeking to invalidate a patent based on obviousness must demonstrate by clear and convincing evidence that a skilled artisan would have been motivated to combine the teachings of the prior art references to

¹ Google also argues that the YouTube Remote prior art disclosed a remote playback queue when a YTR1 or YTR2 user selected a list of service-recommended videos for playback (Google Br. 9–11). Because this order finds that YTR2 party mode disclosed a remote playback queue, however, it does not reach this argument.

1 achieve the claimed invention, and that the skilled artisan would have had a reasonable
 2 expectation of success in doing so.” *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*,
 3 566 F.3d 989, 994 (Fed. Cir. 2009) (internal quotation marks and citation omitted). The first
 4 step in an obviousness analysis is proper construction of the claim to determine its scope and
 5 meaning, and the second step is comparison of the properly construed claim to the prior art.
 6 *Medichem, S.A. v. Rolabo, S.L.*, 353 F.3d 928, 933 (Fed. Cir. 2003).

7 Here, the parties agree on the construction of the central claim term: a “remote playback
 8 queue” is a “playback queue,” as construed in the prior order, that is also “remote” (Dkt. Nos.
 9 560–61). And, they interpret “remote” almost identically. Sonos explains that “the term
 10 ‘remote’ refers to a location different from (*i.e.*, not local to) the ‘computing device’ or the
 11 ‘playback device,’” whereas Google proposes it means “geographically distant from the
 12 claimed computing and playback devices” (*compare* Dkt. No. 560 at 2, *with* Dkt. No. 561 at 1).
 13 For the purpose of evaluating movant Google’s invalidity arguments, this order adopts non-
 14 movant Sonos’s phrasing and construes “remote” as “not local to the claimed computing
 15 device or playback device.” As such, a “remote playback queue” is a “playback queue” that is
 16 “not local to the claimed computing device or playback device.” Applying the construction of
 17 “playback queue” from the prior order, a “remote playback queue” is “a list of multimedia
 18 content selected for playback that is not local to the claimed computing device or playback
 19 device.”

20 With this agreed-upon construction, does claim 1 of the ’033 patent read on the prior art?
 21 For the reasons that follow, this order concludes that it does.

22 C. OVERVIEW OF PRIOR ART.

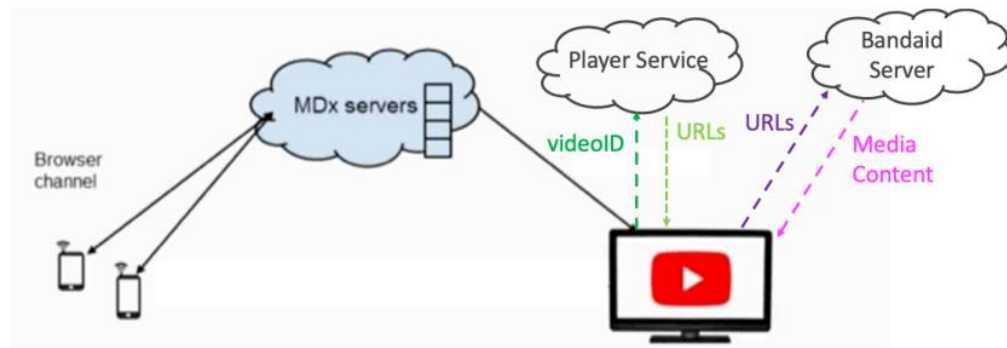
23 Let’s start with the prior art. The YouTube Remote application allowed a user to display
 24 YouTube videos on one or more screens (*e.g.*, televisions) and control playback of those
 25 YouTube videos from one or more mobile devices (*e.g.*, phone and tablet). First released in
 26 November 2010 and later discontinued, it functioned like casting, but the YouTube Remote
 27 application required a user to separately navigate to an intermediary website on each of the
 28 devices and log in to the same YouTube account to pair them.

1 Party mode was a feature that Google developed after releasing YTR1, reducing it to
2 practice on July 12, 2011, and releasing it in YTR2. Whereas YTR1 allowed for *one user* to
3 manage a queue of YouTube videos and transfer playback from one or more mobile devices to
4 one or more screens, YTR2 party mode allowed for *two or more users* to manage a queue of
5 YouTube videos and transfer playback from two or more mobile devices to one or more
6 screens. To reiterate, YTR2 predated the '033 patent priority date of December 30, 2011, with
7 YTR2.03 and YTR2.07 released on July 29, 2011, and August 10, 2011, respectively.

8 To initiate party mode, a host user would select a queue of YouTube videos for playback
9 on a mobile device running YTR2 and invite one or more guest users with a mobile device
10 running YTR2. If the guest user(s) accepted the host user's invitation, the host user's mobile
11 device would send a message to a cloud server (called the "MDx server") with the list of
12 identifiers for the queue of videos selected for playback (called "videoIds"). The cloud server
13 would store this list of identifiers in the "party queue" and then send a message with the list of
14 identifiers to the mobile device(s) of the guest user(s), where it would be stored locally
15 (Bhattacharjee Rpt. ¶¶ 171–75; Schmidt Rebuttal Rpt. ¶¶ 207–08).

16 In party mode, the host user and guest user(s) managed the same queue of videos, which
17 was stored in the party queue on the cloud server and on each of their mobile devices. If the
18 host user or guest user(s) made a change to the queue of videos (*e.g.*, removing the last video),
19 her mobile device would send an update message to the cloud server, which would store the
20 updated list of identifiers in the party queue. The cloud server would then send a message with
21 the updated list of identifiers to the mobile devices of the host user and guest user(s), which
22 was again stored locally. If playback was transferred to one or more of the host user's screens,
23 the queue of videos was stored on the screen(s) as well, and the message with the updated list
24 of identifiers would also go to the screen(s) to be stored locally (Bhattacharjee Rpt. ¶¶ 176–77;
25 Schmidt Rebuttal Rpt. ¶¶ 213–14).

To transfer playback to a screen in party mode, the host or guest user(s) would press a “Connect” button in the application and the cloud server would send a message to the screen identifying one or more videos for playback. For each video, that screen would send a corresponding identifier it had stored locally to another cloud server (called “Player Service”) to obtain a URL (called a “Bandaaid URL”). That URL would enable the screen to retrieve the media content (audio and video content) corresponding to the identifier from yet another cloud server in Google’s Content Delivery Network (called “Bandaaid”), which would then be played back (Bhattacharjee Rpt. ¶¶ 327–29, 340; Schmidt Rpt. ¶¶ 162–66; Schmidt Rebuttal Rpt. ¶¶ 174–76). Sonos’s expert provides a helpful diagram of this process, which is based on a Google diagram produced in discovery:



Transferring Playback in YTR2 Party Mode.

(Schmidt Rpt. ¶ 166).

As for the '998 patent, the prior order stated, in pertinent part:

The '998 patent is prior art. It was filed on March 7, 2011, and claims priority to an earlier provision[al] application filed in November 2010. The patent’s inventors were involved with the development of the YouTube Remote system, and the patent relates to controlling playback on a playback device through a control device

[T]he patent disclosed that a “user interface” of a “remote control” (e.g., a smart phone) can display “previously paired controlled devices” (e.g., a television) so that a user may select and control “one or more paired controlled devices.”

1 Google, 2022 WL 3046752, at *9. This user interface was called the “device-picker,” which
2 was added to source code for the YouTube Remote application dated December 1, 2011 —
3 again, before the priority date of the ’033 patent, December 30, 2011. The device-picker was
4 released with YouTube Remote version 3 (“YTR3”) in January 2012.

5 This order will first consider Google’s arguments as to the “remote playback queue”
6 limitations allegedly disclosed by the YTR2 system (1.4, 1.7, 1.8, and 1.9), and then circle
7 back to the “selection of playback devices” limitations allegedly taught by the ’998 patent (1.5
8 and 1.6).

9 **D. LIMITATION 1.4.**

10 Limitation 1.4 requires a “computing device” that is “configured for playback of a remote
11 playback queue provided by a cloud-based computing system associated with a cloud-based
12 media service” (’033 patent 17:40–42). The “computing device” corresponds to the control
13 device discussed above, which is itself configured for playback at this stage. In other words,
14 the playback captured by limitation 1.4 is taking place on a control device (*e.g.*, a phone) and
15 has not yet been transferred to a playback device (*e.g.*, a television).

16 According to Google, YTR2 party mode disclosed limitation 1.4. Because the party
17 queue was a playback queue, and the cloud server provided the party queue to the
18 geographically distant mobile devices of the host and guest user(s), those mobile devices were
19 ostensibly configured for playback of a remote playback queue provided by a cloud-based
20 computing system (Google Br. 6–7). According to Sonos, however, party mode was “simply a
21 mode that allow[ed] multiple YouTube accounts to add songs to the same queue” and that
22 “d[id] not change anything about the location of the playback queue” (Sonos Opp. 3). Sonos
23 emphasizes that in party mode and non-party mode alike, the mobile devices of host and guest
24 user(s) and the host user’s screen(s) all had and relied on their own local playback queues
25 (Sonos Opp. 7).

26 True, the mobile devices of host and guest user(s) and the host user’s screen(s) all had
27 and relied on their own local playback queues. Google expressly acknowledges that the party
28 queue was “copied to a device for the purposes of facilitating local playback” and that it did

not “eliminate[] the playback queue on the playback device in favor of a cloud queue” until 2014 (Dkt. No. 561 at 1; Google Reply Br. 1). In other words, it is undisputed that the mobile devices of the host and guest user(s) stored the list of identifiers for the queue of videos selected for playback locally. But it is also undisputed that the cloud server stored the list of identifiers for the queue of videos selected for playback in the party queue (Google Br. 3 (citing Bhattacharjee Rpt. ¶¶ 171–73); Sonos Opp. 5 (citing Schmidt Rebuttal Rpt. ¶ 207); *see also* Schmidt Rebuttal Rpt. ¶ 204). That list was a playback queue (“a list of multimedia content selected for playback”) and that server was remote (“not local to the claimed computing device or playback device”). Putting it all together, the party queue was a list of multimedia content selected for playback that was not local to the claimed computing or playback device. The party queue was a remote playback queue. And, when playback had not yet been transferred to a screen, the mobile device in YTR2 party mode was configured for playback of a remote playback queue.

That mobile devices and screens *also* had *local* playback queues did not mean that the party queue was not a remote playback queue. The reader will recall that Google did not rule out the possibility that the YouTube Remote prior art could have employed both, which YTR2 party mode did. What we have here is the situation described by the Google expert in which “the system might store the playback queue both at the local playback device and remotely” (Bhattacharjee Showdown Rebuttal Rpt. ¶ 320). Indeed, the YouTube Remote prior art was strikingly similar to the embodiment that the prior order distinguished (’033 patent 16:16–27). This “third party application not only t[old] the local playback system what to play, but also maintain[ed] two-way communication with the local playback . . . system” (*id.* at 16:18–21). And “[t]wo way communication help[ed] enable features such as keeping a local playback queue synchronized with a queue that the user [was] editing/managing in the third party application” (*id.* at 16:21–24).

In YTR1 and YTR2 non-party mode, the queue that the user was editing/managing to which the local playback queue was synchronized was the local playback queue on the user’s mobile device. There were no other users, and there was no queue saved on a cloud server. In

YTR2 party mode, however, the queue that the user was editing/managing to which the local playback queue was synchronized was the remote playback queue. Only this queue, the party queue saved on the cloud server, reflected changes made by both this user and other user(s) in the party. “In short, the cloud queue r[an] the show” in YTR2 party mode as well. *Google*, 2022 WL 3046752, at *6.

Because YTR2 party mode disclosed a computing device that was configured for playback of a remote playback queue provided by a cloud-based computing system, the YTR2 system satisfied limitation 1.4.

E. LIMITATION 1.7.

The parties take up limitation 1.7 in parts, so this order will do the same.

Limitation 1.7(a) requires that the computing device, “based on receiving [] user input,” “transmit[] an instruction for the at least one given playback device to take over responsibility for playback of the remote playback queue from the computing device” (’033 patent 17:53–56). Both sides agree that a mobile device running YTR2 party mode (computing device) transmitted a message (instruction) for a screen (playback device) to take over responsibility for playback once a user pressed (user input) the Connect button (Google Reply Br. 5; Sonos Opp. 9; *see also* Bhattacharjee Rpt. ¶ 332; Schmidt Rpt. ¶ 164). According to Google, because this computing device was configured for playback of a remote playback queue, this instruction was for taking over playback responsibility of a remote playback queue (Google Reply Br. 5). According to Sonos, however, the instruction was for taking over playback of a local playback queue, not a remote playback queue, because the playback devices were only configured for playback of a local playback queue (Sonos Opp. 8). This order has already explained why that is not the case. As such, it is apparent that a computing device running YTR2 party mode transmitted an instruction for a playback device to take over playback responsibility of a remote playback queue from a computing device.

Limitation 1.7(b) provides that the instruction to take over responsibility for playback configures the playback device to “(i) communicate with the cloud-based computing system in order to obtain data identifying a next one or more media items that are in the remote playback

1 queue, (ii) use the obtained data to retrieve at least one media item in the remote playback
 2 queue from the cloud-based media service; and (iii) play back the retrieved at least one media
 3 item ('033 patent 17:58–65). The specification teaches that the data identifying a next one or
 4 more media items can take different forms, including “song identifier” or “URL” (*id.* at 12:37,
 5 56). What’s more, it specifically teaches that a URL “can be passed to a playback device to
 6 fetch content from a cloud,” and “[s]ongs and/or other multi-media can be retrieved from the
 7 Internet rather than a local device” (*id.* at 12:52–53, 57–58).

8 Recall once playback was transferred to a screen in YTR2 party mode, that screen would
 9 receive a message from the cloud server identifying one or more videos for playback. For each
 10 video, the screen would send a corresponding identifier it had stored locally to another cloud
 11 server (Player Service) to obtain a URL (Bandaidd URL), which would enable it to retrieve the
 12 media content (audio and video content) corresponding to the identifier from yet another cloud
 13 server in Google’s Content Delivery Network (Bandaidd) for playback. YTR2 party mode
 14 disclosed limitation 7(b) because once the screen received an instruction to take over
 15 responsibility for playback, it sent a message to the Player Service to obtain a Bandaidd URL
 16 that was used to retrieve media content from the Bandaidd server and play back that retrieved
 17 content. As such, the playback device running YTR2 party mode was configured to
 18 “communicate with [the] cloud-based computing system” (Player Service) to “obtain data
 19 identifying a next one or more media items” (Bandaidd URLs) and “use the obtained data to
 20 retrieve at least one media item in the remote playback queue” (audio and video content) to
 21 “playback the retrieved at least one media item,” as required (Google Br. 11).

22 Sonos disagrees that YTR2 party mode disclosed this limitation for three reasons (Sonos
 23 Opp. 8–10). None is availing.

24 *First*, Sonos argues that the identifiers (videoIds), not the URLs (Bandaidd URLs),
 25 constituted “*data identifying* a next one or more *media items* that are in the remote playback
 26 queue” (Sonos Opp. 8) (emphasis in original). According to Sonos, because those identifiers
 27 were stored locally on the screen in a local playback queue in YTR2 party mode, they were not
 28 “in the remote playback queue,” as required by limitation 1.7(b). Although Sonos suggests

that “the parties dispute whether ‘data identifying a next one or more media items’ has to be a URL or could be another type of identifier,” both sides acknowledge that such data could be identifiers or URLs, consistent with the language in the specification (Sonos Opp. 8; Google Reply Br. 6 n.5; *see* ’033 patent 12:37, 56). And, as discussed, devices configured for playback in YTR2 party mode had identifiers and URLs. Irrespective of whether the identifiers constituted “data identifying a next one or more media items,” the URLs clearly did.

The playback device in limitation 1.7(b) “obtain[s] data identifying a next one or more media items that are in the remote playback queue” *as well as* “use[s] the obtained data to retrieve at least one media item” and “play back the retrieved at least one media item.” It is undisputed that screens used URLs to retrieve and play back media content in YTR2 party mode (Schmidt Rpt. ¶ 164 (recognizing playback device “use[d] the one or more [Bandaïd] URLs to retrieve the media item from one or more ‘Bandaïd’ servers . . . and then render[ed] [*i.e.*, played back] the retrieved media item”); *see also* Schmidt Dep. 147:6–148:10; Bhattacharjee Rpt. ¶¶ 328–29).

Second, Sonos argues that limitation 1.7(b) requires that the “data identify[] a *next* one or more media items,” whereas “[t]he Bandaïd URLs Google points to only identif[ied] the *current* media item for playback, not the *next* media item” (Sonos Opp. 9 (citing Schmidt Rebuttal Rpt. ¶¶ 176, 212)) (emphasis in original). In other words, “Google’s argument thus equates the claim term ‘next’ with ‘current’” when the patent specification distinguishes those terms elsewhere (Sonos Opp. 9 (citing ’033 patent 16:49–67)).

Not so. The parties do not dispute that the screen in YTR2 party mode carried out the process of: (i) receiving a message from the (MDx) cloud server identifying a video for playback; (ii) sending a corresponding (videoId) identifier to another (Player Service) cloud server to receive a (Bandaïd) URL; (iii) sending that (Bandaïd) URL to yet another (Bandaïd) cloud server to retrieve media (audio and video) content; (iv) and playing back that media content (Google Br. 11; Sonos Opp. 9). Nor do they dispute that this happened for each video in the party queue (*ibid.*; *see also* Schmidt Rpt. ¶ 164; Bhattacharjee Rpt. ¶ 328). Thus, the screen clearly “communicate[d] with the cloud-based computing system in order to obtain data

identifying a *next one or more* media items that are in the remote playback queue.” That there might have only been one video in that queue is accounted for when the limitation describes “us[ing] the obtained data to retrieve *at least one* media item” and “play[ing] back the retrieved *at least one* media item.” Read in context, “next” must include — but is not limited to — “current” here.

Third, Sonos argues that in YTR2 party mode, the screen did not “obtain data identifying a next one or more items that are in the *remote playback queue*” because it played items from its local playback queue (Sonos Opp. 9–10) (emphasis in original). After all, according to Sonos, “[s]creens in YTR[2] party mode d[id] not ‘ask[] the MDx [cloud] server for which video to play next when the current [video] ended’” and they instead “simply play[ed] the next video in their local playback queue” (*ibid.*).

But, as Google notes, limitation 1.7(b) does not require the playback device to “fetch ‘data identifying . . . media items’ directly ‘from [the] remote playback queue’” (Google Reply Br. 7 (quoting Sonos Opp. 9–10)). Rather, it requires that the playback device “obtain[] data identifying a next one or more media items *that are in the* remote playback queue,” and “use[] the obtained data to retrieve” and “play back the retrieved at least one media item.” That is what the screen in YTR2 party mode did. It received a message from the (MDx) cloud server identifying a video for playback *before* it sent the corresponding identifier to the Player Service and the corresponding URL to the Bandaid server. In sum, YTR2 party mode tracked limitation 1.7.

F. LIMITATIONS 1.8–1.9.

Limitation 1.8 requires that the computing device “detect[] an indication that playback responsibility for the remote playback queue has been successfully transferred from the computing device to the at least one given playback device” (’033 patent 17:66–18:2). Limitation 1.9 requires that, after detecting this indication, the computing device “control the at least one given playback device’s playback of the remote playback queue” and is itself “no longer configured for playback of the remote playback queue” (*id.* at 18:3–10). According to Google, the YTR2 system disclosed these limitations because the application displayed a

“Connected to [] screen” dialogue box once a host or guest user transferred playback to a screen, as demonstrated in the video from Google’s invalidity contentions showing how the YouTube Remote application worked (Google Br. 13).² Sonos does not address these limitations in its opposition and did not address them at the hearing, so this order incorporates its general argument that the YTR2 system used a local playback queue, not a remote playback queue, which it already rejected.

This order observes that the video discussed by Google was uploaded on November 14, 2010 — shortly after the release of YTR1 on November 9, 2010, and well-before the release of YTR2.03 on July 29, 2011. Even so, there is no evidence on this record that this dialogue box was removed or changed in YTR2. To the contrary, Google’s arguments at the patent showdown appear to have relied on both YTR1 and YTR2 systems, just without discussing party mode (Bhattacharjee Showdown Rpt. ¶¶ 169–71). This order therefore agrees with Google that the dialogue box demonstrated that the mobile device in the YTR2 system detected an indication playback responsibility had been successfully transferred, that it was configured to control a screen’s playback of a remote playback queue, and that it was itself no longer configured for playback of a remote playback queue. As such, the YTR2 system satisfied limitations 1.8 and 1.9.

G. LIMITATIONS 1.5–1.6.

Having found that the YTR2 system disclosed all of the “remote playback queue” limitations, this order turns to the “selection of playback devices” limitations allegedly taught by the ’998 patent.

Limitation 1.5 requires that the computing device “display[] a representation of one or more playback devices in a media playback system” available to accept playback responsibility for the remote playback queue (’033 patent 17:43–48). Limitation 1.6 requires that the computing device “receiv[e] user input indicating a selection of at least one given playback device from the one or more playback devices” (*id.* at 17:49–52). As Google observes, the

² Citing <https://www.youtube.com/watch?v=EGdsOslqG2s> (last visited April 11, 2023).

prior order addressed a very similar limitation in claim 13 of the '615 patent, which required the computing device to “display[] . . . playback devices connected to the local area network” and receive user input indicating “a selection of [a] particular playback device from the identified playback devices” (Google Br. 14). *Google*, 2022 WL 3046752, at *9–10 (citing '998 patent 10:62–11:6). It found the YouTube Remote prior art’s Connect button did not allow a user to select a subset of available playback devices, but the '998 patent disclosed the device-picker and taught the selection of playback devices, as contemplated by the '615 patent. Absent countervailing evidence, that Google produced YouTube Remote application source code incorporating the device-picker (December 1, 2011,) mere months after Sonos’s claimed priority date for the '615 patent (July 15, 2011,) and released the functionality to the public with YTR3 (January 2012) clearly and convincingly demonstrated that a person of ordinary skill in the art would have been motivated to incorporate the teachings of the '998 patent. Her reasonable expectation of success was also self-evident. Accordingly, the prior order concluded that it would have been obvious to combine the prior art references and invalidated the asserted claim of the '615 patent.

Sonos raises no new evidence that demands a different outcome here. It did not address these limitations in its opposition, but it included language from its expert’s rebuttal report on this point in its slides for the hearing. The only new argument is that “there would be no need to use a device-picker to select a particular [screen] for playback” in YTR2 party mode “when the desire [was] to have multiple [screens] for playback” (Schmidt Rebuttal Rpt. ¶ 351). It does not persuade. Even in party mode, a user might have considered it desirable to play back media on some screens (*e.g.*, in the living room and kitchen) and not others (*e.g.*, in the den). No evidence on this record suggests otherwise.

The '998 patent taught the selection of playback devices, as contemplated by limitations 1.5 and 1.6. That Google produced YouTube Remote application source code achieving the proposed modification *roughly one month before* Sonos’s claimed priority date for the '033 patent (December 30, 2011,) clearly and convincingly demonstrates that a person of ordinary skill in art would have been motivated to incorporate the teachings of the '998 patent and

1 would have had a reasonable expectation of success in doing so. Indeed, as Google observes,
2 motivation and reasonable expectation of success are *even stronger* for the '033 patent, with
3 Sonos having claimed an earlier priority date (July 15, 2011,) for the '615 patent (Google
4 Br. 14 n.3).

5 Accordingly, this order finds the YTR2 system, combined with the '998 patent, rendered
6 claim 1 of the '033 patent obvious.

7 ***H. REMAINING INDEPENDENT AND DEPENDENT CLAIMS.***

8 Having found claim 1 invalid as obvious, this order considers the remaining asserted
9 claims of the '033 patent. Because claim 12 of the '033 patent is nearly identical to claim 1,
10 just directed to a computer-readable medium instead of a computing device, this order finds
11 that independent claim obvious over the YTR2 system and the '998 patent as well. The same
12 logic applies to dependent claims 2, 9, 11, 13, and 16, for which Sonos simply incorporates its
13 validity arguments for the independent claims (Bhattacharjee Rpt. ¶¶ 338–61).

14 As Google observes, the only dependent claim for which Sonos raises additional
15 argument is claim 4, though this argument was not briefed by Sonos in its opposition (Google
16 Br. 14). Claim 4 of the '033 patent recites that the representation of one or more playback
17 devices in limitation 1.5 is for a “group of playback devices . . . that are to be configured for
18 synchronous playback” ('033 patent 18:23–32). But this order agrees with Google’s expert
19 that “[b]ecause the YTR system already disclosed the ability to detect, display and transfer
20 playback to multiple devices, allowing multiple devices to be represented by a single icon
21 (rather than two separate icons) would have been an obvious design choice requiring only
22 minor modification to the user interface display” based on the device-picker disclosed in the
23 '998 patent and absent evidence to the contrary (Bhattacharjee Rpt. ¶ 646).

24 In sum, this order concludes that YTR2 party mode disclosed a remote playback queue,
25 and it would have been obvious to combine the YTR2 system and the '998 patent to achieve
26 the claimed invention. Google’s motion as to the invalidity of the asserted claims of the '033
27 patent is **GRANTED**.

1 **2. GOOGLE’S MOTION: INVALIDITY OF THE ’885 AND ’966**
2 **PATENTS.**

3 Now we turn from casting to “zone scene management” and the ’885 and ’966 patents.
4 Once more, our analysis starts with our analysis of the ’885 patent at the patent showdown.
5 *Google LLC v. Sonos, Inc.*, 2022 WL 2870527 (N.D. Cal. July 21, 2022). The ’885 and ’966
6 patents have identical specifications. Both are directed toward a “method and apparatus for
7 controlling or manipulating a plurality of multimedia players in a multi-zone system” (’885
8 and ’966 patents 1:32–34). The asserted claims teach a user to customize and save multiple
9 groups of smart speakers or other players, each according to a “theme or scene,” and then
10 “activate” a customized group, called a “zone scene,” on demand (*id.* at 2:46–51).

11 Once more, this order refers the reader to the prior order for an in-depth introduction to
12 the underlying technology and the accused products. By way of review, in a multi-zone
13 system, a “player” is a speaker, television, or similar device that can play content. The patents
14 refer to the player’s location, such as a bedroom, as a “zone,” and the player therein as a “zone
15 player” (*see, e.g., id.* at 2:36–41; 3:13–23). According to the specifications, prior to 2006, it
16 was difficult for users to dynamically control speaker groups. Audio sources were “hard-
17 wired” or “controlled by a pre-configured and pre-programmed controller,” which ostensibly
18 made it cumbersome to “dynamically manag[e] the ad hoc creation and deletion of groups,”
19 particularly when desired groups overlapped (*id.* at 1:62–2:2:25). Put another way, someone
20 who enjoyed “listen[ing] to broadcast news from his/her favorite radio station in a bedroom, a
21 bathroom, and a den while preparing to go to work in the morning” but also preferred to “listen
22 in the den and the living room to music . . . in the evening” would not have been able to easily
23 configure a traditional audio system to accommodate those preferences on account of then-
24 existing technological and physical hurdles (*ibid.*).

25 The ’885 and ’966 patents ostensibly solved this problem by providing a “mechanism” to
26 “allow a user to group” multimedia players “according to a theme or scene, where each of the
27 players is located in a zone” (*id.* at 2:36–41). Then, “[w]hen the scene [was] activated, the
28 players in the scene react[ed] in a synchronized manner” (*id.* at 2:41–42). This allowed a user

to customize and save multiple groups of speakers or other players, each according to a “theme or scene,” and then later “activate” a customized group, called a “zone scene,” on demand (*id.* at 2:46–51). Thus, the person who enjoyed listening to broadcast news in the morning could form a “zone scene” called “Morning” that consisted of speakers in the bedroom, bathroom, and den, and activate that group on demand using an application on the controller device (*e.g.*, a phone). And, that same person, who also enjoyed listening to music in the evening, could form and activate on demand another “zone scene” called “Evening” that consisted of speakers in the den and living room.

The prior order ruled that Google infringed claim 1 of the ’885 patent. Specifically, assuming *arguendo* that Google’s definition of zone scene as “a previously saved grouping of zone players according to a common theme” was correct, that order found Google’s accused products infringed claim 1 because a user’s ability to name speaker groups meant a user could group speakers according to a common theme. *Google*, 2022 WL 2870527, at *4. It also rejected two invalidity arguments: that claim 1 of the ’885 patent was directed toward unpatentable subject matter, and that the ’885 patent lacked written description support. *Id.* at *6–9. This order evaluates a different invalidity argument: that the asserted claim of the ’885 patent (and, by extension, the asserted claims of the ’966 patent,) are invalid as obvious over prior art.³

A. OVERVIEW OF ASSERTED CLAIMS.

Sonos asserts claim 1 of the ’885 patent and claims 1–2, 4, 6, 8–10, 12, 14, and 16 of the ’966 patent. Claim 1 of the ’885 patent and claims 1 and 9 of the ’966 patent are independent claims, whereas claims 2, 4, 6, 8, 10, 12, 14, and 16 of the ’966 patent are dependent claims.

³ After rejecting Google’s invalidity arguments, the undersigned ordered Google to show cause as to why summary judgment in favor of Sonos on validity should not be entered (Dkt. No. 339). Another order declined to consider the new invalidity argument Google raised in response and entered summary judgment in favor of Sonos on validity of claim 1 of the ’885 patent (Dkt. No. 382). Google then moved for reconsideration based on *Mikkelsen Graphic Engineering, Inc. v. Zund America, Inc.*, 541 F. App’x 964 (Fed. Cir. 2013). Upon reconsideration, a subsequent order agreed that *Mikkelsen* “caution[ed] against entering summary judgment against non-movants in like circumstances” and withdrew the ruling on validity (Dkt. No. 539). Google now raises that new argument as a movant.

Note the '966 patent is drafted from the perspective of the controller device that controls zone players and makes groups (*e.g.*, a phone), whereas the '885 patent is drafted from the perspective of a zone player itself (*e.g.*, a speaker). Sonos filed the applications that led to the '885 and '966 patents on April 12, 2019, but the applications claim priority through a long chain of continuation applications dating back to a provisional application filed on September 12, 2006. Sonos claims an earlier conception date of December 2005.

Like the briefing and the parties at the hearing, this order focuses on claim 1 of the '885 patent. Using Google's paragraph numbering, claim 1 of the '885 patent recites:

[1.0] A first zone player comprising:

[1.1] a network interface that is configured to communicatively couple the first zone player to at least one data network;

[1.2] one or more processors;

[1.3] a non-transitory computer-readable medium; and

[1.4] program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

[1.5] while operating in a standalone mode in which the first zone player is configured to play back media individually in a networked media playback system comprising the first zone player and at least two other zone players:

[1.6] (i) receiving, from a network device over a data network, a first indication that the first zone player has been added to a first *zone scene* comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first *zone scene* is invoked; and

[1.7] (ii) receiving, from the network device over the data network, a second indication that the first zone player has been added to a second *zone scene* comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second *zone scene* is invoked, wherein the second zone player is different than the third zone player;

[1.8] after receiving the first and second indications, continuing to operate in the standalone mode until a given one of the first and second *zone scenes* has been selected for invocation;

[1.9] after the given one of the first and second *zone scenes* has been selected for invocation, receiving, from the network device over the data network, an instruction to operate in accordance with a given one of the first and second *zone scenes* respectively comprising a given one of the first and second predefined groupings of zone players; and

[1.10] based on the instruction, transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players such that the first zone player is configured to coordinate with at least one other zone player in the given one of the first and second predefined groupings of zone players over a data network in order to output media in synchrony with output of media by the at least one other zone player in the given one of the first and second predefined groupings of zone players.

(’885 patent 11:37–12:23). “Zone scene,” in play here, is italicized above. Google asserts that claim 1 of the ’885 patent and all asserted claims of the ’966 patent are invalid as obvious over two prior art references: Sonos’s prior art speaker system from 2005 and “modifications suggested to Sonos by users of that system” in customer posts on Sonos online forums (Google Br. 15). Sonos disagrees and contends that the prior art did not disclose zone scene technology as required by limitations 1.5–1.10 and the corresponding limitations of the ’966 patent (Sonos Opp. 10–19; Dkt. No. 468-7 at 41–43, 85–88).

B. OVERVIEW OF PRIOR ART.

As for prior art, the Sonos 2005 system was the initial version of Sonos’s wireless multi-zone system. It launched no later than January 2005, well before both Sonos’s claimed conception date of December 2005 and the provisional filing date of September 12, 2006 (*see* Almeroth Rebuttal Rpt. ¶ 265). The parties agree that the Sonos 2005 system disclosed “smart” speakers that could be grouped for synchronous playback, and they generally agree on how that grouping worked (Google Br. 16 (citing Almeroth Rebuttal Rpt. ¶ 266); Sonos Opp. 11 (citing Millington Decl. ¶ 5)). In essence, speakers in the Sonos 2005 system could be added to a temporary group individually, and that temporary group would be activated for playback immediately. Once a user no longer wished to use that temporary group for playback, it ceased to exist. The only saved group was (yet another) “party mode,” which allowed a user to immediately commence synchronous playback of a group of all speakers in her system (Schonfeld Rpt. ¶¶ 107, 114; Millington Decl. ¶ 7).

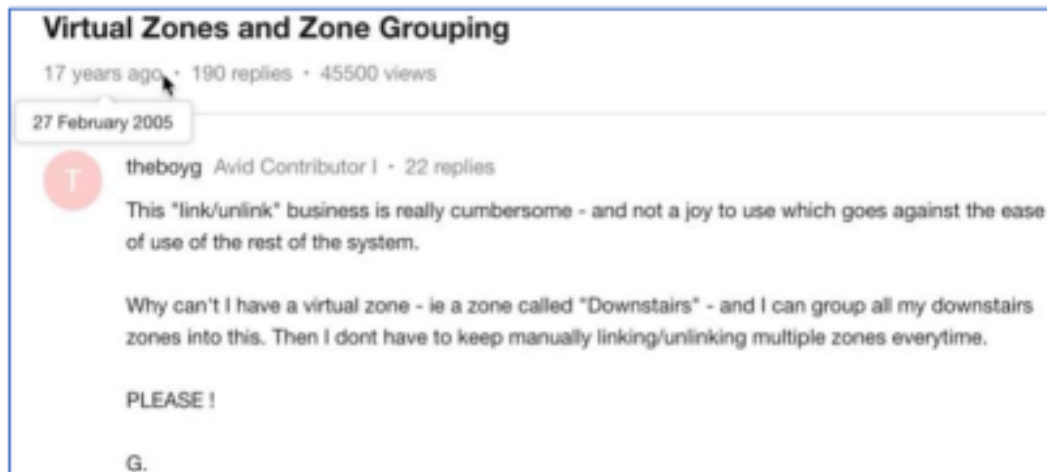
Although the parties dispute the extent to which the Sonos 2005 system disclosed the zone scene requirements of the asserted limitations, they generally agree that this system did not allow for speaker groups that could be named, saved, and later activated on-demand (Google Br. 15–16 (citing Schonfeld Reply Br. 1 ¶ 18; Dkt. No. 484-8 (Lambourn Emails)); Sonos Opp. 11–12 (citing Lambourn Decl. ¶¶ 8–11)).

This is where the forum posts come in. According to Google, “[t]o the extent not disclosed in the Sonos 2005 prior art system itself, customer comments on the Sonos forums disclose[d] the ‘zone scene’ elements of claim 1 of the ’885 patent” (Google Br. 18). It focuses on two illustrative posts from two threads on those forums:

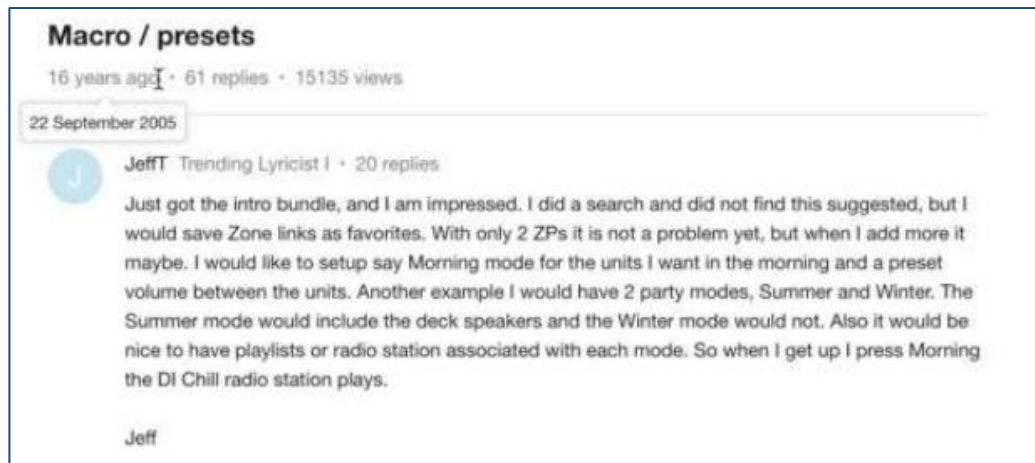
In the first [thread], “Virtual Zones and Zone Grouping,” “theboyg” stated that the way the Sonos 2005 system permitted users to create groups — by linking and unlinking speakers in real time — was “cumbersome.” He suggested adding to the prior art system “a virtual zone — ie a zone called ‘Downstairs’ that would allow a user to ‘group all [his] downstairs zones’ and avoid the necessity to ‘keep manually linking and unlinking multiple zones everytime’”

The second relevant Sonos forum thread is titled “Macro/Presets.” In that thread, “JeffT” suggested that the Sonos 2005 system “save Zone links [i.e., speakers linked into a group] as favorites” so that, for example, he could set up “2 party modes, Summer and Winter,” where the “Summer mode” would include “the deck speakers and the Winter mode would not.”

(Google Br. 16–17). Again, the forum posts of “theboyg” and “JeffT” were created and publicly available prior to both Sonos’s claimed conception date, December 2005, and the provisional filing date, September 12, 2006. For reference, this order reproduces the posts below:



Forum Post of "theboyg."



Forum Post of "JeffT."

(Google Br. 16–17). Did the Sonos 2005 system and the forum posts together render obvious the “zone scene” limitations? This order finds that genuine disputes of material fact preclude summary judgment of invalidity for obviousness over these two references.

C. LIMITATION 1.7.

By way of example, consider limitation 1.7. It recites a “zone player” that “receiv[es] . . . an indication that [it] has been added to a second zone scene comprising a second predefined grouping of zone players” (’885 patent 11:59–67). Note this second zone scene is different than the first zone scene to which the zone player is added in limitation 1.6 because it does not include at least one zone player in that first zone scene (*id.* at 11:53–58, 61–67).

1 Clearly limitation 1.7 was not satisfied by the Sonos 2005 system. A speaker in that
2 system could not be added to two different predefined groupings of zone players. Even
3 assuming *arguendo* that the party mode grouping of all speakers was a zone scene, a speaker
4 could not be added to a second zone scene because no other groupings could be predefined. In
5 other words, the Sonos 2005 system did not provide for saving additional, overlapping groups.

6 Google argues that the forum posts fill this gap. It emphasizes that “JeffT” expressly
7 suggested adding functionality to include, *inter alia*, “2 party modes, Summer and Winter,”
8 where the Summer mode “would include the deck speakers and the Winter mode would not”
9 (Google. Br. 19 (citing Almeroth Rebuttal Rpt. ¶ 192)). Mapping the forum post onto the
10 language of limitation 1.7, it discloses a “zone player” that is “added to a second zone scene
11 [Winter mode] comprising a second predefined grouping of zone players” (that is different
12 than the first zone scene because Summer mode does not include the deck speakers). Although
13 Sonos does not directly dispute that this forum post disclosed saving additional, overlapping
14 groups, it takes issue with the fact that the forum post did not disclose the “indication,” the
15 “claimed communications between the zone players and controllers necessary for setting up
16 and invoking zone scenes,” among other specific terms in other specific limitations (Sonos
17 Opp. 13–14). Yet such rigid adherence to the language of the claims is not required to show
18 obviousness. Indeed, the Supreme Court has expressly cautioned against a “narrow conception
19 of the obviousness inquiry” in favor of “an expansive and flexible approach.” *KSR Int’l Co. v.*
20 *Teleflex Inc.*, 550 U.S. 398, 402, 415 (2007).

21 But Google is not out of the woods yet. After all, “[a] party seeking to invalidate a patent
22 based on obviousness must demonstrate by clear and convincing evidence that a skilled artisan
23 would have been motivated to combine the teachings of the prior art references to achieve the
24 claimed invention, and that the skilled artisan would have had a reasonable expectation of
25 success in doing so.” *Procter & Gamble*, 566 F.3d at 994. The Federal Circuit has recently
26 emphasized the “clear distinction in [its] case law between a patent challenger’s burden to
27 prove that a skilled artisan would have been motivated to combine prior art references and the
28 additional requirement that the patent challenger also prove that the skilled artisan would have

1 had a reasonable expectation of successfully achieving the claimed invention from the
 2 combination.” *Eli Lilly & Co. v. Teva Pharms. Int’l GmbH*, 8 F.4th 1331, 1344 (Fed. Cir.
 3 2021). In other words, these are separate requirements. A finding that an alleged infringer has
 4 demonstrated a motivation to combine prior art references does not necessarily mean that the
 5 alleged infringer has also demonstrated a reasonable expectation of success in achieving the
 6 claimed invention by doing so. *Ibid*.

7 According to Google, “[b]ecause the Sonos forum posts expressly discuss modifying the
 8 Sonos 2005 system, there is a clear motivation to combine the prior art system and the users’
 9 suggested modifications to that system” (Google Br. 18). As Sonos observes, however,
 10 Google makes an analytical leap here, assuming that the existence of forum posts expressing
 11 motivation to combine prior art references means that a person of ordinary skill in the art
 12 would have had motivation to combine prior art references (Sonos Opp. 15). Worse, Google
 13 fails to address whether that person of ordinary skill in the art would have had a reasonable
 14 expectation of success in achieving the claimed invention. Indeed, it does not speak to
 15 reasonable expectation of success *at all*, even after Sonos pointed this out in its opposition
 16 (*ibid.*). Google has failed to meet its burden.

17 Recall, Sonos filed its provisional patent application directed to zone scene technology
 18 on September 12, 2006, and claims an earlier conception date of December 2005. The Sonos
 19 2005 system was launched no later than January 2005 (Google Br. 16 (citing Almeroth
 20 Rebuttal Rpt. ¶ 265)). Users “theboyg” and “JeffT” weighed in later that year, on February 27,
 21 2005, and September 22, 2005, respectively (Google Br. 16–17 (citing Almeroth Rebuttal Rpt.
 22 ¶ 193)). So did Sonos engineer Robert Lambourn, inventor of the ’885 and ’966 patents and
 23 Sonos’s director of user experience design at the time. He sent an email to a colleague on
 24 April 11, 2005, suggesting two new approaches to grouping speakers, one of which “would
 25 allow a user with one click to put their Zones into predefined groups,” like “downstairs,”
 26 “upstairs,” and “morning” (Lambourn Emails at 1). Lambourn then “began to design and
 27 develop [the] new technology” (Lambourn Decl. ¶ 13). But Sonos did not file the application
 28 that led to the ’885 and ’966 patents until April 12, 2019, and it did not release the zone scenes

feature (as “room groups”) until 2020. What’s more, Sonos points to a dozen articles from the likes of *CNN* and *Engadget* praising the introduction of this feature upon release (Sonos Opp. 19 (citing Almeroth Rebuttal Rpt. ¶¶ 1613–40)).

The Federal Circuit has “consistently pronounced that all evidence pertaining to the objective indicia of nonobviousness must be considered before reaching an obviousness conclusion.” *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1355 (Fed. Cir. 2013). And “[s]econdary considerations evidence can establish that an invention appearing to have been obvious in light of the prior art was not and may be the most probative and cogent evidence in the record.” *Apple Inc. v. Int’l Trade Comm’n*, 725 F.3d 1356, 1366 (Fed. Cir. 2013). Here, a reasonable jury could find that the gap in time and substantial praise demonstrate a person of ordinary skill in the art would not have had a reasonable expectation of success in achieving the claimed invention — even assuming that person would have been motivated to combine the teachings of the Sonos 2005 system with those of “theboyg” and “JeffT.” Google will have to make its best case in front of a jury. A genuine dispute of material fact remains that precludes finding the asserted claim of the ’885 patent invalid.

Google focuses its analysis on the ’885 patent but attaches a “comprehensive chart identifying how the prior art that renders obvious the asserted claim of the ’885 patent also renders obvious the asserted claims of the ’966 patent” (Google Br. 20). Because this order has not found that prior art renders obvious the asserted claim of the ’885 patent, it declines to reach the asserted claims of the ’966 patent (or the acceptability of this chart). Google’s motion as to the invalidity of the asserted claims of the ’885 and ’966 patents is **DENIED**.

3. GOOGLE’S MOTION: NO WILLFUL OR INDIRECT INFRINGEMENT.

Next, this order considers willful and indirect infringement. Google moves for summary judgment of no willful or indirect infringement of the ’033, ’885, and ’966 patents. Because this order finds the asserted claims of the ’033 patent invalid, it only considers this motion as to the ’885 and ’966 patents. Google’s motion as to the ’033 patent is **DENIED AS MOOT**.

According to Google, Sonos is no closer to providing evidence that Google had the required “knowledge of the patent,” “knowledge of infringement,” and “specific intent to

1 infringe at the time of the challenged conduct” than it was when an order dismissed Sonos’s
2 claims for willful and indirect infringement last March (Google Br. 24). *See Sonos*, 591 F.
3 Supp. 3d at 643. As Google recognizes, however, a subsequent order allowed Sonos amend its
4 pleadings in light of the “special twist” in this case: Google had commenced its own
5 declaratory judgment action *before* Sonos filed its affirmative infringement action (Google Br.
6 24 (quoting *Sonos*, 591 F. Supp. 3d at 647)). Sonos argues that there remains a genuine
7 dispute of material fact as to whether Google was at least willfully blind to its infringement.

8 Upon review, this order agrees with Sonos with respect to the ’966 patent, which was
9 asserted in Sonos’s original complaint. Knowledge of infringement and specific intent may be
10 inferred from circumstantial evidence. *Warsaw Orthopedic, Inc. v. NuVasive, Inc.*, 824 F.3d
11 1344, 1347 (Fed. Cir. 2016) (citing *Glob.-Tech Appliances, Inc. v. SEB S.A.*, 563 U.S. 754,
12 770–71 (2011)). Google had enough notice of this patent to file its own complaint for
13 declaratory relief based on non-infringement and invalidity, and that would go a long way in
14 supplying the knowledge and intent necessary for willful and indirect infringement — or so a
15 jury could reasonably find based on the evidence in this record.

16 Such reasoning, however, has no bearing on the ’885 patent, which issued roughly two
17 months *after* all of this litigation began and was subsequently added. The undersigned
18 previously allowed Sonos to amend its complaint to plead willful and indirect infringement of
19 this patent as well based in large part on the “forty-day notice” between when Sonos allegedly
20 provided Google a draft of its amended complaint during a meet-and-confer and when Sonos
21 allegedly filed that amended complaint. *Sonos, Inc. v. Google LLC*, 2022 WL 2046828, at *3
22 (N.D. Cal. June 7, 2022). As pointed out by Google in its present motion, however, Sonos
23 actually filed that amended complaint with its motion to amend a mere three days after the
24 meet-and-confer (Google Reply Br. 15 (citing No. C 21-07559 WHA, Dkt. No. 39-1)). With
25 that in mind — and without a showing of countervailing support drawing upon the more
26 complete record — it can no longer be said that Google had a meaningful opportunity to
27 investigate allegations of infringement of the ’885 patent with the notice provided.
28

1 Because a genuine dispute of material fact remains as to whether Google committed
2 willful or indirect infringement of the '966 patent, Google's motion as to willful and indirect
3 infringement of the '966 patent is **DENIED**. Because Google has shown that there are no
4 genuine disputes of material fact as to whether it committed willful or indirect infringement of
5 the '885 patent, however, Google's motion as to willful and indirect infringement of the '885
6 patent is **GRANTED**.

7 **4. SONOS'S MOTION: BREACH OF CONTRACT AND CONVERSION.**

8 This order now turns to Sonos's motion for summary judgment on Google's claims of
9 breach of contract and conversion, which derive from a 2013 collaboration agreement between
10 the parties (SAC ¶¶ 85–97). According to Google, Sonos claimed as its own Google's
11 intellectual property rights arising from Google's development work in integrating Google
12 Play Music with Sonos speakers, even though their agreement gave Google intellectual
13 property rights “‘arising from or related’ to ‘any and all development work done by or on
14 behalf of Google in creating the integrated offering’” (Google Opp. 1 (quoting Dkt. No. 479-4
15 § 3.4)). According to Sonos, however, it invented the “direct control” technology underlying
16 that development work in 2011 when it filed the application (specification only) that led to the
17 '033 patent, and Sonos never assigned intellectual property rights ostensibly arising from that
18 application to Google in the 2013 agreement (Sonos Br. 1, 10–15). Sonos further argues that
19 even if such development work *was* Google's intellectual property under the 2013 agreement
20 — and Sonos would have breached that agreement and committed conversion when it filed the
21 claims for the '033 patent in 2019 — the 2013 agreement had by then been superseded by
22 another agreement such that there could be no breach (Sonos Br. 2, 15–16).

23 Google offered to “withdraw [these] claims without prejudice” to “streamline the issues
24 for summary judgment and trial” if this order decided the asserted claims of the '033 patent are
25 invalid, which it has (Dkt. No. 552). This order finds Google's suggested resolution
26 appropriate to keep trial focused on what has always been the fulcrum of this dispute: patent
27 infringement and associated defenses. Sonos's motion for summary judgment is therefore
28

DENIED AS MOOT, with the understanding that the breach of contract and conversion claims are out of the case.

5. GOOGLE’S MOTION: NON-INFRINGEMENT OF THE ’885 AND ’966 PATENTS BASED ON PURPORTED DESIGN-AROUND.

Lastly, this order circles back to Google’s motion. After the prior order granted summary judgment of infringement of claim 1 of the ’885 patent, Google apparently began changing its products and introducing a redesigned speaker that it disclosed to Sonos during discovery (Google Br. 20). Google contends that its redesigned speaker no longer infringes the asserted claim of the ’885 patent — and cannot infringe the asserted claims of the ’966 patent — because the redesigned speaker no longer operates in “standalone mode” after it is added to a new speaker group before that group is invoked (Google Br. 22). In brief, a speaker operating in standalone mode “is configured to playback media individually,” and Google has added a new function to its source code (“StopCurrentApp()”) that requires a redesigned speaker to stop playback before being added to a group (’885 patent 11:47–48; Google Br. 22). Sonos counters that the redesigned speaker continues to operate in standalone mode even under such circumstances and thereby continues to infringe the asserted claims of the ’885 and ’966 patents (Sonos Opp. 21, 23).

This order will not allow Google to cut to the front of the line in order to vet its purported design-around when so many questions of fact (and law) involving the original accused products remain. Experience teaches that the evaluation of redesigned products is aided by analysis of the main issues at trial, which will include the original speakers’ infringement of the asserted claims of the ’966 patent. Google will have to wait its turn. The redesigned speaker will be vetted in due course. Google’s motion as to non-infringement of the asserted claims of the ’885 and ’966 patents based on its purported design-around is **DEFERRED**.

CONCLUSION

For the foregoing reasons, Google’s motion for summary judgment is **GRANTED IN PART, DENIED IN PART**, and **DEFERRED IN PART**. Specifically, Google’s motion as to invalidity of the ’033 patent and no willful or indirect infringement of the ’885 patent is

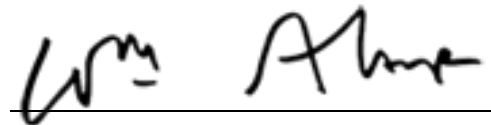
GRANTED. Google's motion as to invalidity of the '885 and '966 patents, and no willful or indirect infringement of the '966 patent is **DENIED**, whereas Google's motion as to no willful or indirect infringement of the '033 patent is **DENIED AS MOOT**. Google's motion as to non-infringement of the '885 and '966 patents based on a purported design-around is **DEFERRED**. Meanwhile, Sonos's motion for summary judgment as to Google's breach of contract and conversion claims is **DENIED AS MOOT**.

The issues now set for trial are: (i) Sonos's claim for infringement (direct, willful, and indirect) of the asserted claims of the '966 patent; (ii) Google's counterclaim for non-infringement of the asserted claims of the '966 patent; (iii) Google's counterclaims for invalidity of the asserted claims of the '885 and '966 patents; (iv) damages for infringement of the asserted claim of the '885 patent; and (v) any and all remaining issues in the entire case, except the undersigned will consider Google's purported design-around in a bench trial after the rest of the issues are tried before the jury.

This order hereby **CONSOLIDATES** this action and the related affirmative infringement action (No. C 21-07559 WHA) for the purpose of taking them to trial. If the parties object, they are ordered to show cause by **TUESDAY, APRIL 18, 2023, at 5:00 P.M.**

IT IS SO ORDERED.

Dated: April 13, 2023.



WILLIAM ALSUP
UNITED STATES DISTRICT JUDGE

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

SONOS, INC.,
Plaintiff,

v.

GOOGLE LLC,
Defendant.

No. C 20-06754 WHA
No. C 21-07559 WHA

(Consolidated)

**ORDER RE PROSECUTION
LACHES AND POST-TRIAL
MOTIONS**

INTRODUCTION

In the lead-up to trial, all agreed that any remaining affirmative defenses would be decided by the judge after the jury verdict. Following a verdict in favor of the patent holder, the judge has now considered those defenses. Under the doctrine of prosecution laches, this order finds and holds that the patents in suit are **UNENFORCEABLE**.

The essence of this order is that the patents issued after an unreasonable, inexcusable, and prejudicial delay of *over thirteen years* by the patent holder, Sonos, Inc. Sonos filed the provisional application from which the patents in suit claim priority in 2006, but it did not file the applications for these patents and present the asserted claims for examination until 2019. By the time these patents issued in 2019 and 2020, the industry had already marched on and put the claimed invention into practice.

1 In fact, in 2014, five years before Sonos filed the applications and presented the claims,
2 accused infringer Google LLC shared with Sonos a plan for a product that would practice what
3 would become the claimed invention. The parties were exploring a potential collaboration, but
4 it never materialized. Google then began introducing its own products that practiced the
5 invention in 2015. Even so, Sonos waited until 2019 to pursue claims on the invention (and
6 until 2020 to roll out the invention in its own product line). Because Sonos's applications for
7 the patents in suit ostensibly descended from the 2006 provisional application, Sonos claimed a
8 priority date before Google's disclosures and product releases. Once the patents in suit issued,
9 Google's work putting the invention into practice fell under a cloud of infringement.

10 Trial brought to light what happened here. This was not a case of an inventor leading the
11 industry to something new. This was a case of the industry leading with something new and,
12 only then, an inventor coming out of the woodwork to say that he had come up with the idea
13 first — wringing fresh claims to read on a competitor's products from an ancient application.

14 Even if the provisional application Sonos filed in 2006 or the corresponding non-
15 provisional application Sonos filed in 2007 had actually disclosed the invention, that would be
16 all the more reason to hold Sonos waited too long to claim it, to the prejudice of Google, not to
17 mention other companies and consumers. But, as will be shown below, those applications
18 failed to disclose the invention. What's more, in 2019, during the prosecution of the
19 applications for the patents in suit, Sonos amended the specification to insert new matter,
20 despite telling the patent examiner the inserted matter was not new. Under black letter patent
21 law, that new matter necessarily sunk any claim of priority.

22 STATEMENT

23 This order constitutes findings of fact and conclusions of law, the affirmative defense of
24 prosecution laches having been tried to the bench. All declarative statements herein are
25 findings of fact.

26 The patents in suit are United States Patent Nos. 10,848,885 and 10,469,966. They
27 generally concern managing groups of multimedia players (*e.g.*, "smart speakers") in a
28 multiroom system. Much like how one can customize, save, and invoke groups of email

1 addresses from selected contacts with a name like “Ball Team” or “Band,” the patents
2 contemplate customizing, saving, and invoking groups of multimedia players from selected
3 rooms with a name like “Morning” or “Downstairs.” They refer to the multimedia players as
4 “zone players” and the customized, saved groups of zone players that can be invoked on
5 demand as “zone scenes.” Specifically, the patents in suit claim devices that implement
6 *overlapping* zone scenes, which share one or more zone players. Just as a single email address
7 can be a member of “Ball Team” *and* “Band,” a single zone player can be a member of
8 “Morning” *and* “Downstairs.”

9 This order will now walk through the relevant history, but a short synopsis helps.

10 Seeking to improve upon the wireless multiroom audio system it released in 2005, Sonos
11 set out to patent zone scenes, *i.e.*, customized, saved groups of zone players that could be
12 invoked on demand. Sonos filed a provisional application in 2006, a corresponding non-
13 provisional application in 2007, and a daisy chain of continuation applications over the next
14 decade. During the prosecution of those applications, however, the patent examiner insisted
15 that the prior art had already disclosed this idea. Sonos’s applications were repeatedly rejected,
16 and Sonos only secured zone scene claims with variations of little consequence.

17 Then, in 2019, Sonos filed continuation applications for the patents in suit. To get
18 around the prior art, Sonos sought to patent zone scenes with a new twist: overlap. With
19 overlap, a zone player could be a member of more than one zone scene at the same time. This
20 was thirteen years after Sonos filed the provisional application, but also five years after Google
21 had *itself* disclosed overlapping zone scenes to Sonos, and four years after Google had released
22 products that implemented the feature. Initially, Sonos’s applications for the patents in suit
23 were rejected on obviousness grounds. Yet after Sonos amended the applications to
24 incorporate new specification language (with new matter) and narrowed claim language (with
25 “standalone mode” limitations), they issued as patents. Sonos promptly asserted these patents
26 against Google.

1 **1. THE SONOS 2005 PRIOR ART SYSTEM.**

2 At the turn of the century, home audio typically involved radios, turntables, and CD
3 players in individual rooms. Although a lucky few had multiroom systems that allowed them
4 to play the same music in more than one room, those systems required installers to pull wires
5 through the walls and ceilings.

6 Founded in Santa Barbara in 2002, Sonos set out to make multiroom audio higher tech,
7 lower cost, and more accessible by creating a wireless system built on computer networks and
8 processors. It envisioned placing devices, called “zone players,” in various rooms of the home
9 to provide music for those rooms, or “zones.” Each zone player would be connected to other
10 zone players and to the internet using network technology, not wires, and operated using a
11 hand-held controller with a screen, not an infrared remote control. A key feature of Sonos’s
12 vision was the ability to group zone players in different zones to play music in synchrony.

13 In 2003, as Rincon Networks, Sonos began designing hardware and writing software for
14 its first wireless multiroom audio system. By summer 2004, it demoed product prototypes at
15 the All Things Digital conference. And, by January 2005, Sonos shipped its first commercial
16 wireless multiroom audio system. All agree that the system was prior art for our purposes.
17 This order will refer to it as the Sonos 2005 prior art system. It consisted of the ZonePlayer
18 100 (“ZP100”) and the Controller 100 (“CR100”).

19 Readers familiar with Sonos’s contemporary products should be mindful that these
20 earlier products were different. The ZP100 was a wireless internet-connected “smart
21 amplifier” rather than a smart speaker. Sonos’s first zone players were wirelessly connected to
22 other zone players and to the internet, but each one was still hard-wired to the speaker(s) it
23 powered. Sonos released its first wireless internet-connected smart speaker in September 2014
24 (which, incidentally, did not practice the claimed invention; that did not occur until June 2020).
25 Moreover, the CR100 was a discrete hand-held controller rather than an app on a mobile
26 device. Recall, in 2005, the iPhone was still two years in the future. Sonos’s first controller
27 was its own hardware product with a non-touch screen and buttons that allowed a user to
28

1 manage zone players and music playback. Sonos released its first controller app for mobile
2 devices (the iPhone and iPod Touch) in October 2008.

3 The Sonos 2005 prior art system made waves, drawing attention from the likes of
4 Microsoft Cofounder Bill Gates at the flagship Consumer Electronics Show that year.
5 Importantly, this first commercial wireless multiroom system allowed for grouping zone
6 players in different zones to play music in synchrony. However, as Sonos Chief Innovation
7 Officer Nicholas Millington and Sonos Director of User Experience Robert Lambourne both
8 testified, this system had limitations in terms of how zone players could be grouped.
9 Lambourne went on to be listed as the named inventor on the applications for the patents in
10 suit and the applications from which they descend.

11 As stated, a key feature of Sonos's vision was the ability to group zone players in
12 different zones to play music in synchrony. The Sonos 2005 prior art system achieved this
13 using "ad hoc grouping," in which zone players were grouped on the fly. For a user to create a
14 "zone group" in which selected zone players would play the same music at the same time, that
15 user had to link a first zone player to one or more additional zone players, one at a time. The
16 linked additional zone player(s) would be instantly configured to play music in synchrony with
17 the first zone player as soon as the linking occurred. If a user then wanted to play music on a
18 zone player within that zone group separately or in a new zone group, that user had to destroy
19 the existing zone group by dropping one or more linked additional zone players, one at a time.

20 Significantly, "zone groups" were not "zone scenes." They did not allow a user to
21 customize and save groups of zone players that could be invoked on demand. Nor did they
22 allow a user to create a group of zone players that included one or more zone players from an
23 existing group without destroying the existing group. In other words, zone groups could play
24 different music simultaneously in different sets of zone players, but zone players could be
25 members of only one zone group. Zone groups could not *overlap*.

26 To demonstrate, imagine a user of the Sonos 2005 prior art system had four zone players
27 in four zones: one in her dining room, one in her living room, one in her bedroom, and one in
28 her bathroom. Let's say she started out playing Joan Baez in her dining room. If she wanted

1 to play Joan Baez in her dining room *and living room* simultaneously, she would create a zone
2 group by linking those zone players on her controller, selecting “Dining Room,” then “Link
3 Zone,” and then “Living Room.” “Living Room” would be instantly configured to play Joan
4 Baez in synchrony with “Dining Room.” If she paused, resumed, or changed the music, the
5 music would be paused, resumed, or changed in the dining room and living room.

6 In the meantime, our user could play Bob Dylan in her bedroom. She could also play
7 Bob Dylan in her bedroom *and bathroom* simultaneously, creating another zone group by
8 linking those zone players on her controller, selecting “Bedroom,” then “Link Zone,” and then
9 “Bathroom.” “Bathroom” would be instantly configured to play Bob Dylan in synchrony with
10 “Bedroom.” At this point, our user would have two distinct zone groups: one composed of
11 “Dining Room” and “Living Room” playing Joan Baez, the other composed of “Bedroom” and
12 “Bathroom” playing Bob Dylan.

13 Say our user now wanted to listen to Joan Baez in her bedroom as well. She would first
14 destroy the zone group composed of the zone players in her bedroom and bathroom by
15 unlinking those zone players using her controller, selecting that zone group, then “Drop Zone,”
16 and then “Bathroom.” She would then link the zone player in her bedroom to the zone group
17 composed of the zone players in her dining room and living room by selecting that zone group,
18 then “Link Zone,” and then “Bedroom.” “Living Room” *and* “Bedroom” would be instantly
19 configured to play Joan Baez in synchrony with “Dining Room.” This would create a *new*,
20 *real-time* zone group composed of the zone players in her dining room, living room, and
21 bedroom. The zone group composed of just the zone players in her dining room and living
22 room would *no longer exist*.

23 Note the Sonos 2005 prior art system did not allow users to select multiple zone players
24 and link or unlink them simultaneously. Users had to select individual zone players and link or
25 unlink them one at a time. There was a way to link multiple zone players simultaneously in the
26 Sonos 2005 prior art system, however. This was done using the built-in “All Zones-Party
27 Mode” feature, “party mode” for short.
28

In the Sonos 2005 prior art system, “All Zones-Party Mode” was listed alongside available zone players under “Link Zone.” When selected, it simultaneously linked *all* of the zone players in a given system (thereby destroying any ad hoc zone group). So, if our user was playing Joan Baez in her dining room and wanted to play Joan Baez throughout, she would simultaneously link all of the zone players in her system on her controller, selecting “Dining Room,” then “Link Zone,” and then “All Zones-Party Mode.” “Living Room,” “Bedroom,” and “Bathroom” would be instantly configured to play Joan Baez in synchrony with “Dining Room.” As explained by Inventor Lambourne, “[i]t was sort of a shortcut to grouping all of the rooms together” that “was baked into the product” (Tr. 420:9–10, 15). After selecting party mode, however, if a user wanted to play music on fewer than all of the zone players, there was no shortcut. That user would have to unlink individual zone players, one at a time. Thus, if our user wanted to play Joan Baez only in the dining room after selecting party mode, she would have to drop the zone players in the living room, bedroom, and bathroom, one by one.

Putting it all together, in the Sonos 2005 prior art system, the only way to link zone players simultaneously was using party mode, which linked all of the zone players. A user of the Sonos 2005 prior art system could not customize and save a group of zone players to invoke on demand, much less customize and save *multiple* groups of zone players *with one or more overlapping zone players* to invoke on demand.

2. THE IDEAS OF ZONE SCENES AND OVERLAPPING ZONE SCENES.

The grouping limitations of the Sonos 2005 prior art system led Sonos customers and employees to explore potential improvements.

A. CUSTOMER COMMENTS AND INVENTOR SKETCHES.

Not long after Sonos first shipped the Sonos 2005 prior art system, customers began posting comments on Sonos’s own online forums calling for more advanced grouping functionalities.

On February 27, 2005, in a forum post titled “Virtual Zones and Zone Grouping,” a customer going by the name of “theboyg” observed, “[t]his ‘link/unlink’ business is really cumbersome,” and asked, “[w]hy can’t I have a virtual zone — ie a zone called ‘Downstairs’”

1 so that “I can group all my downstairs zones into this” and “I don’t have to keep manually
2 linking/unlinking multiple zones everytime” (TX2424). In other words, back in 2005, theboyg
3 requested a customized, saved group of zone players that could be invoked on demand.

4 On September 22, 2005, in a forum post titled “Macro / presets,” a customer going by the
5 name of “JeffT” took it a step further, suggesting “save[d] Zone links,” such as “Morning
6 mode for the units I want in the morning,” and “2 party modes, Summer and Winter,” in which
7 “[t]he Summer mode would include the deck speakers and the Winter mode would not”
8 (TX3930). In other words, back in 2005, JeffT requested customized, saved, *overlapping*
9 groups of zone players that could be invoked on demand.

10 Sonos did not introduce such grouping functionalities to its products until June 2020.
11 Contemporaneously with these Sonos forum posts, however, Inventor Lambourne set forth
12 parallel ideas in his notebooks and correspondence.

13 In one notebook sketch, Inventor Lambourne depicted an alarm clock feature that would
14 allow a user to select music to wake up to and rooms to play that music in — a customized,
15 saved group of zone players that could be invoked on demand. This sketch was undated, but
16 the date listed two pages later was February 28, 2005, one day after theboyg’s request for a
17 “Downstairs” group (TX8236 at 40, 42). Shortly thereafter, in another notebook sketch,
18 Inventor Lambourne depicted permanently joining one or more zone players together. This
19 sketch was also undated, but the date listed on the following page was March 2, 2005 (TX6539
20 at 2–3).

21 The following month, Inventor Lambourne traded emails with a Sonos colleague,
22 Andrew Schulert, about the grouping limitations of their own home systems. They compared
23 the merits of Inventor Lambourne’s proposed “Permanent Zone Groups” approach, in which
24 zones could be configured to always appear as one entity, and Inventor Lambourne’s proposed
25 “Zone Profiles” approach, in which zones could be put into different customized, saved groups
26 that could be invoked on demand, such as “downstairs” and “mornings.” Inventor Lambourne
27 observed that “making the UI [*i.e.*, user interface] simple enough” was a problem with the
28

1 proposed Zone Profiles approach. Colleague Schulert said his first reaction was that the Zone
2 Profiles approach “would be the biggest bang for the buck” (TX0120 at 1).

3 And, on October 21, 2005, one month after JeffT’s request for “Summer” and “Winter”
4 groups, Inventor Lambourne sketched “Alarm Clock / Zone Profiles / Groups,” with a circle
5 that said, “group profiles,” and text below it that said, “[p]ick a room group/profile, same room
6 can be in two groups” (TX6539 at 24). That same day, he also sketched “Room Join Macros”
7 illustrating “downstairs,” “party mode,” and “morning mode” alongside each other and a new
8 group being formed, with text that explained “one room can be part of 2 sets” — customized,
9 saved, *overlapping* groups of zone players that could be invoked on demand (TX6539 at 31).

10 **B. THE UI DOCUMENTS.**

11 On December 21, 2005, Inventor Lambourne wrote up a UI document setting out a path
12 for new grouping functionality based on “zone scenes” (TX6545). He also wrote up another
13 UI document focused on the alarm clock feature, which referred to “zone scenes” (TX6544
14 at 27). Although the UI documents look like user manuals, they were internal, exploratory
15 documents, for Sonos use only. The UI documents were supplied to the jury and the judge as
16 conception documents because the parties stipulated that they disclosed the claimed invention.
17 This order accepts this stipulation without weighing in on the adequacy of the disclosure. As
18 such, the stipulated conception date is December 21, 2005.

19 Relevant here, the zone scenes UI document offered two improvements to the grouping
20 functionality of the Sonos 2005 prior art system. *First*, it described “zone scenes,” *i.e.*,
21 customized, saved groups of zone players that could be invoked on demand. *Second*, it
22 described a nimbler form of ad hoc grouping.

23 Let’s start with “zone scenes.” According to the zones scenes UI document, “[t]he Zone
24 Scene feature” would “allow[] the user to arrange the zones into groups using one single
25 command” (TX6545 at 2). “Simple Scenes” would allow a user to set up one group in a zone
26 scene. The document gave the example of a “Morning Scene” that could group zone players in
27 the bedroom, den, and dining room, while leaving the remaining zone players in the bathroom,
28 family room, and foyer untouched (*id.* at 2). “Advanced Scenes” would allow a user to set up

1 more than one group in a zone scene. The document gave the example of an “Evening Scene”
2 that could group zone players in the bedroom, den, and dining room — and, separately, the
3 garage and garden — with the remaining zone players in the bathroom, family room, and foyer
4 “separated from any group if they were part of a group before the Zone Scene was invoked”
5 (*id.* at 2–3).

6 The zone scenes UI document *explicitly disclosed* customizing and saving a group of
7 zone players that could be invoked on demand like “Morning Scene” and “Evening Scene.” It
8 also explicitly disclosed customizing and saving several such groups, depicting selection from
9 a “Party Mode” zone scene and a “Morning Wakeup” zone scene in one instance, as well as
10 from a “Party Mode” zone scene, a “Wakeup” zone scene, and a “Garden Party” zone scene in
11 another (*id.* at 5–6). But the zone scenes UI document *did not explicitly disclose* customized,
12 saved, *overlapping* groups of zone players that could be invoked on demand. Whereas
13 Inventor Lambourne’s notebook sketches had text that stated the “same room can be in two
14 groups” and “one room can be part of 2 sets,” no such text can be found in the zone scenes UI
15 document (*see* TX6539 at 24, 31). Note “Morning Scene” and “Evening Scene” belonged to
16 different systems, with the system in which “Evening Scene” was created containing additional
17 zone players in the garage and garden. Similarly, there was no explicit disclosure of
18 customized, saved, overlapping groups of zone players that could be invoked on demand in the
19 alarm clock UI document.

20 So how did the UI documents disclose the claimed invention? They *implicitly disclosed*
21 overlapping zone scenes by reference to party mode in the Sonos 2005 prior art system.
22 Significantly, the alarm clock UI document stated that “‘Party Mode’ that currently ships with
23 the product is one example of a Zone Scene” (TX6544 at 27). The zone scenes UI document
24 similarly referred to the “current Party Mode setting” and represented “Party Mode” as a “Zone
25 Scene” in various figures (TX6545 at 2; *see id.* at 5–6). When the zone scenes UI document
26 showed a “Party Mode” zone scene next to a “Morning Wakeup” zone scene in one instance,
27 and a “Party Mode” zone scene next to “Wakeup” and “Garden Party” zone scenes in another,
28 it would have been understood that zone scenes would overlap because it would have been

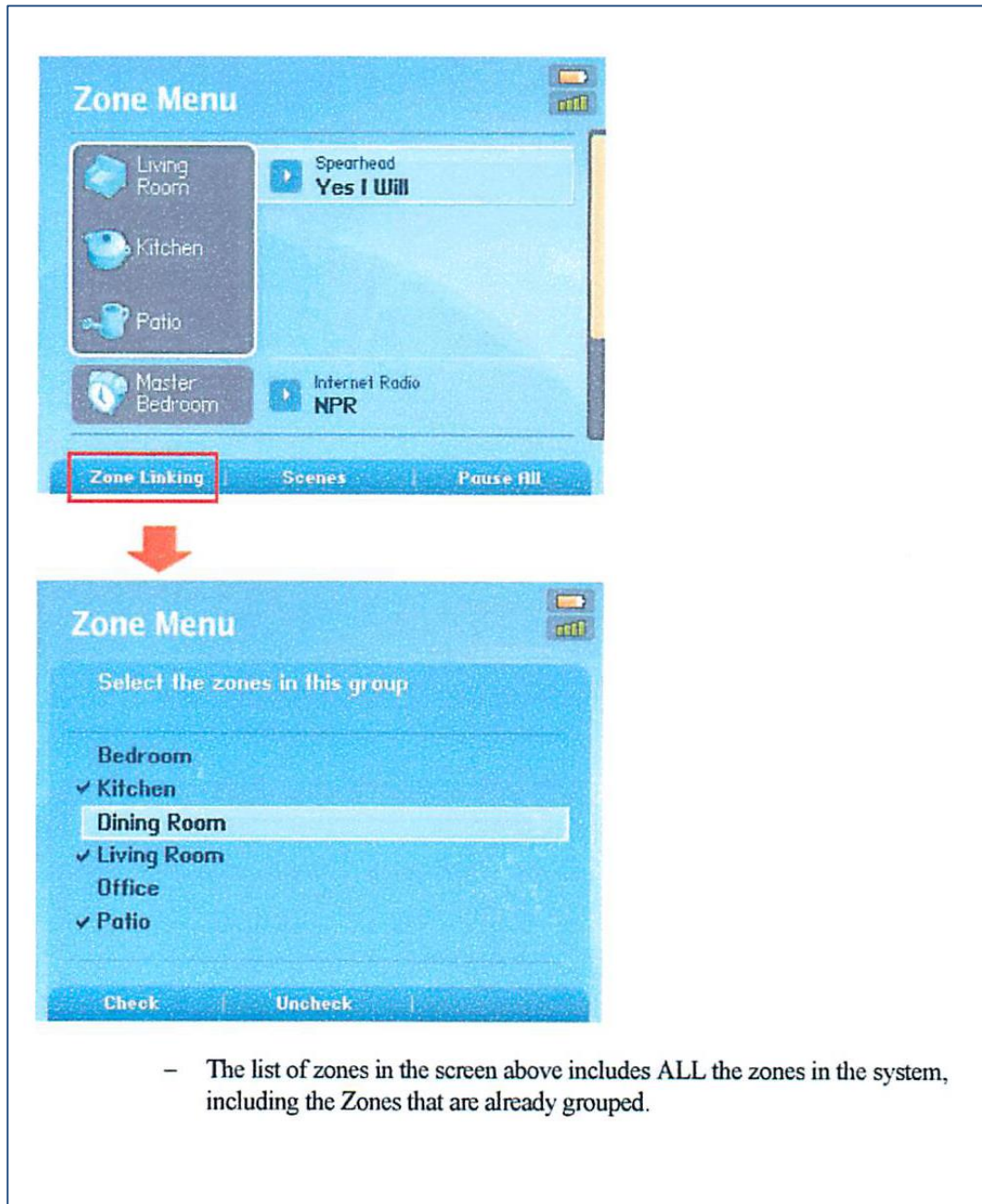
understood that the “Party Mode” zone scene would group all of the zone players in a given system. As such, the UI documents implicitly disclosed customized, saved, overlapping groups of zone players that could be invoked on demand. To be sure, this disclosure depended on inference, but both sides stipulated that the UI documents disclosed the claimed invention. Accordingly, this order credits the implicit disclosure.

* * *

The zone scenes UI document had distinct sections on “Invoking a Scene,” showing “various user Interface methods for invoking a configuration on a Handheld Controller or Desktop Controller,” versus “Scene Setup,” showing various user interface methods for configuring a zone scene from a desktop controller only. According to this document, it was “not expected that the Zone Scenes should be set up using the Handheld Controller” (*id.* at 5, 9).

Meanwhile, the zone scenes UI document had a distinct section on “Alternative Linking Methods,” which showed an “adaptation of the Link and Drop Zone feature” of the Sonos 2005 prior art system, *i.e.*, ad hoc grouping (*id.* at 17–18). Whereas the zone scene feature would allow for groups of zone players to be set up *in advance* on a *desktop controller*, this “Zone Linking” feature would allow for groups of zone players to be set up *in real-time* on a *handheld controller*. It pertained to ad hoc “zone groups,” *not* “zone scenes.” This ad hoc grouping was an improvement over the ad hoc grouping in the Sonos 2005 prior art system, however.

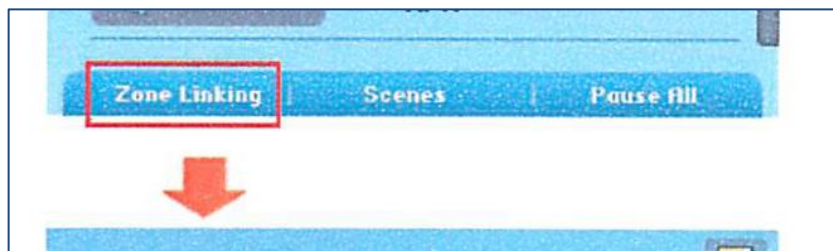
Whereas the ad hoc grouping in the Sonos 2005 prior art system “allow[ed] the user to link and drop Zones *one at a time*,” “[t]his feature would allow the user to link and drop *multiple* zones in one screen,” “check[ing] Zones that w[ould] be a part of a zone group, and uncheck[ing] those that w[ould not]” (*ibid.*) (emphasis added). Here, “the list of the zones in the screen” would “include[] ALL the zones in the system, including the Zones that [were] already grouped” (*id.* at 17). This would allow for more efficient ad hoc grouping. The “Zone Linking” feature was depicted as follows:



Zone Scenes UI Document: "Zone Linking" Feature Diagram.

(*ibid.*).

To repeat, “Zone Linking,” as depicted above, was ad hoc grouping, not “Scene Setup.” Ad hoc “zone groups” were not “zone scenes.” They were addressed in different sections in the zone scenes UI document and even accessed using different soft buttons on the handheld controller. By way of demonstration, the diagram is cropped below:



Zone Scenes UI Document: Cropped “Zone Linking” Feature Diagram (Soft Buttons).

The complete diagram will become all the more important later on in connection with the issue of new matter inserted by way of amendment.

3. THE FIRST ZONE SCENE PATENT APPLICATIONS.

The patents in suit descend from a family of patent applications that claim priority to, or the benefit of, a provisional application filed in September 2006 through a corresponding non-provisional application filed in September 2007. September 2006 was more than one year after the commercial release of the Sonos 2005 prior art system but less than one year after the stipulated conception date. Each of the earlier applications in the “zone scene patent family” is “incorporated by reference in its entirety for all purposes” in its successors, including the patents in suit.¹

¹ Specifically, the April 2019 applications for the ’885 and ’966 patents were continuations of, and claimed priority to, an application filed in April 2016, which issued in July 2022 as United States Patent No. 11,388,532. The April 2016 application for the ’532 patent was a continuation of, and claimed priority to, an application filed in August 2014, which issued in May 2016 as United States Patent No. 9,344,206. The August 2014 application for the ’206 patent was a continuation of, and claimed priority to, an application filed in May 2013, which issued in September 2014 as United States Patent No. 8,843,228. The May 2013 application for the ’228 patent was a continuation of, and claimed priority to, an application filed in September 2007, which issued in July 2013 as United States Patent No. 8,483,853. And, the September 2007 application for the ’853 patent claimed priority to a corresponding provisional application filed in September 2006 as United States Patent Application No. 60/825,407.

The prosecution histories of the applications for the patents in suit are in the trial record, abridged to exclude tens of thousands of pages of prior art references and other publications (gratuitously) submitted (*see* TX004; TX006). The prosecution histories of the parent applications in the patent family are not in the trial record, though the parties provided excerpts in binders requested by the judge during trial (*see* Tr. 1030:13–19). The same holds for the resulting patents (*ibid.*). Seeing that the judge must consider these prosecution histories and patents in order to evaluate arguments raised herein, this order takes judicial notice of these prosecution histories and patents.²

A. THE 2006 PROVISIONAL APPLICATION.

On September 12, 2006, Sonos filed a “provisional application,” with Inventor Lambourne listed as the named inventor, entitled “Controlling and manipulating groupings in a multi-zone music or media system” (TX2651). A provisional application is a temporary form of patent application that is not required to include any patent claims or information disclosure (prior art) and is never reviewed by a patent examiner. It operates as a low-cost placeholder, establishing an earlier effective filing date for a corresponding non-provisional application filed within twelve months that claims its subject matter. Although a provisional application is never “published” or made publicly searchable, it is “made available to the public” as an individual file when a corresponding non-provisional application is published, as one was here eventually.³

The specification of this provisional application consisted of a “Detailed Description of the Preferred Embodiments,” an assortment of implementations involving zones, zone players, zone groups, and zone scenes. It was drafted broadly. Many described embodiments did not relate to zone scenes at all, such as those in which “memory is used to save one or more saved

² Courts may judicially notice facts that “can be accurately and readily determined from sources whose accuracy cannot reasonably be questioned.” Fed. R. Evid. 201(b)(2). Patents and prosecution histories are public records. *Boyden v. Burke*, 55 U.S. 575, 576 (1852); *Data Engine Techs. LLC v. Google LLC*, 906 F.3d 999, 1008 n.2 (Fed. Cir. 2018). They can be accessed using the Patent Center tool on the Patent and Trademark Office website.

³ *See* 35 U.S.C. § 122(b)(2)(A)(iii); 37 C.F.R. § 1.14(a)(1)(iv). Today, the individual files are accessible using the Patent Center tool.

zone configuration files that may be retrieved for modification at any time” and in which “a user creates a zone group including at least two zone players from the controller that sends signals or data to one of the zone players” (TX2651 at 15, 19). In any event, the specification of the provisional application eventually described zone scene technology as follows:

According to one embodiment, a set of zones can be dynamically linked together using one command. Using what is referred to as a zone scene or scene, zones can be configured in a particular scene (e.g., morning, afternoon, or garden), where a predefined zone grouping and setting of attributes in for the grouping are determined.

(*id.* at 21). It also described an “extension of this embodiment to trigger a zone scene command as an alarm clock function” (*id.* at 22). The provisional application did not include any claims.

It did include two sizable appendices, however. Each appendix was “annexed” to the specification to “provid[e] examples to teach and refer to various features, detailed designs, uses, advantages, configurations and characteristics in one embodiment of the present invention” (*id.* at 22–23). At first glance at trial, Appendix A and Appendix B looked identical to the aforementioned zone scenes UI document and alarm clock UI document, respectively (*compare* TX6545 and TX6544, with TX2651 at 29–48 and *id.* at 49–81). Yet, as was discovered at trial and will be taken up below, the UI documents were *altered* before they were annexed to the provisional application specification. In particular, one sentence was omitted from the second page of the zone scenes UI document (*compare* TX6545 at 2, with TX2651 at 30). Meanwhile, the alarm clock UI document nearly doubled in size, but the page on zone scenes was left out (*compare* TX6544 at 27, with TX2651 at 49–81).

Keep in mind that the highlighted language was excluded from the UI documents when they were submitted as appendices to the provisional application specification:

‘Party Mode’ that currently ships with the product is one example of a Zone Scene.

Alarm Clock UI Document, Language Omitted from Appendix B Highlighted.

The Zone Scene feature allows the user to arrange the zones into groups using one single command. This is similar to the current Party Mode setting that is available. However, the Zone Scene feature is much more flexible and powerful.

Zone Scenes UI Document, Language Omitted from Appendix A Highlighted.

(TX6544 at 27; TX6545 at 2). Significantly, whereas both sides agree that the original UI documents disclosed the claimed invention, they dispute whether the provisional application, with these altered versions of the UI documents appended, did so.

B. THE 2007 NON-PROVISIONAL APPLICATION.

On September 11, 2007 — one day short of twelve months after the provisional application was filed — Sonos filed a corresponding non-provisional application with Inventor Lambourne listed as the named inventor, likewise entitled “Controlling and manipulating groupings in a multi-zone music or media system.” This non-provisional application “claim[ed] the benefits of the provisional application” that it “incorporated by reference for all purposes” (’853 patent cross reference to related application). Because the non-provisional application was filed with a request for nonpublication, it was not published until it issued as United States Patent No. 8,483,853 on July 9, 2013. Although this patent has never been asserted against Google or others, its prosecution set a pattern for its descendants.

Like the provisional application, the non-provisional application was drafted broadly. The specification explained that “the present invention pertain[ed] to controlling a plurality of multimedia players, or simply players, in groups” (’853 patent 2:21–22). But it also described, “[a]ccording to one aspect of the present invention, a mechanism . . . to allow a user to group some of the players according to a theme or scene, where each of the players is located in a zone,” and, “[a]ccording to another aspect of the present invention, the scene [being] activated at any time or a specific time” and “used as an alarm” (*id.* at 2:23–26, 31–32, 36). In addition to including patent claims, the non-provisional application included an abstract, a background of the invention, a summary of the invention, a brief description of the drawings, and several new drawings.

On March 8, 2011, the non-provisional application received a non-final rejection from the Patent and Trademark Office, as the patent examiner found that all of its claims were anticipated by another Sonos patent, with CIO Millington listed as the named inventor, published on February 10, 2005. A few months later, on July 7, 2005, following an interview with the patent examiner, Sonos requested reconsideration and amended the non-provisional application “to provide an updated claim set directed to a certain set of embodiments,” apparently those involving zone scenes. Even so, on October 13, 2011, the non-provisional application received a final rejection from the PTO, as the patent examiner found the new claim set unpatentable over a user manual for the Yamaha Digital Mixing Engine (“DME”) 32 system, another “media player and controller” that was “functional in the manner claimed” (Final Rejection, Oct. 13, 2011, at 3). This order will refer to the user manual as the Yamaha DME prior art.

According to the patent examiner, the Yamaha DME prior art taught, *inter alia*, “user interface functions to graphically configure plural audio processor scenes and configurations upon a plurality of cascaded i/o interfaces,” as well as “storage and recall of scenes and configurations comprising specific operation parameters,” “including synchronization and connections among plural networked audio processors” (*ibid.*). This was the first rejection based on the Yamaha DME prior art in the patent family, but it would not be the last. Over the years, the very same patent examiner would go on to reject the applications for the patents in suit and *every single parent application* — often more than once, and often with nearly identical language — based on the Yamaha DME prior art.

After this “final rejection,” having initially declined to amend its claims while seeking continued examination on December 13, 2011, Sonos narrowed them considerably in an amendment submitted on February 7, 2012, and the patent examiner issued a notice of allowance on April 18, 2013. The first zone scene patent issued as the ’853 patent on July 9, 2013, at which point it was published and the provisional application from which it descended was made available to the public. Critically, the ’853 patent did not claim customized, saved,

1 overlapping groups of zone players that could be invoked on demand. As stated, the '853
2 patent has never been asserted against Google (or others).

3 **4. GOOGLE'S DISCLOSURE AND IMPLEMENTATION OF OVERLAPPING ZONE SCENES.**

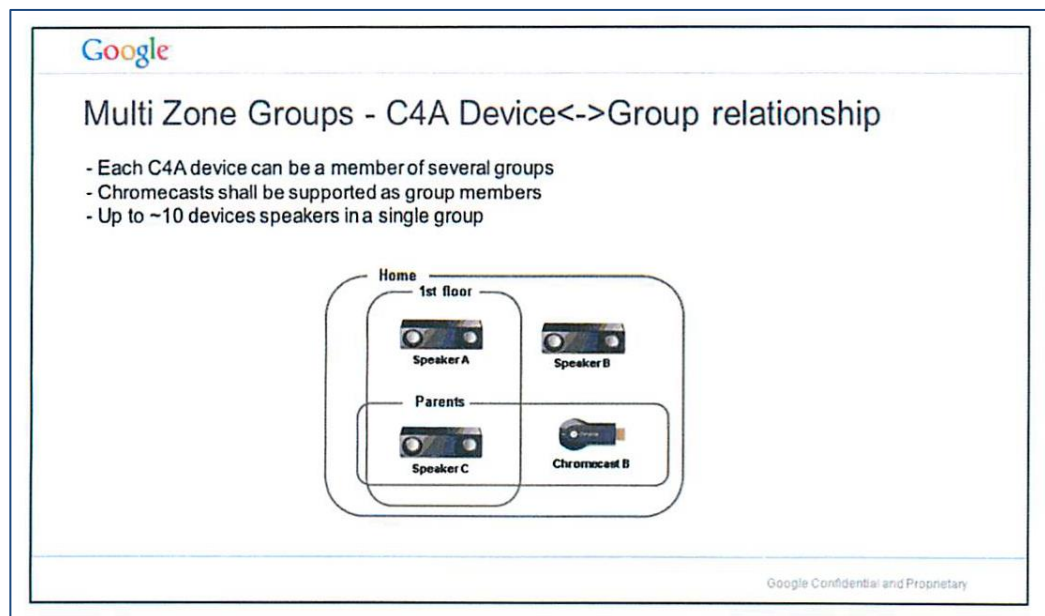
4 Just before the '853 patent issued, Sonos and Google employees exchanged a series of
5 emails that gave rise to meetings between the two companies. By now it was 2013.
6 Smartphones had taken hold, music and video streaming was taking off, and both sides saw
7 that they stood to gain from working with each other. Having just launched a digital music
8 service, Google Play Music, Google was eager to integrate it with Sonos products. Meanwhile,
9 having waited many years for "streaming music adoption to really become a thing," as Sonos
10 General Counsel Alaina Kwasizur put it at trial, Sonos was eager to make more digital music
11 services accessible on its products to further cement its position as the leader in wireless
12 multiroom audio (Tr. 1010:3). Audio-focused competitors Bluesound and Denon would
13 release competing products in 2013 and 2014.

14 According to CIO Millington's testimony, seeing that "one of the key purposes" of Sonos
15 products "was to play streaming music services from the internet," Sonos personnel "had kept
16 in touch over the years with some Google personnel who were working on . . . Google's music
17 services" (Tr. 299:18–20). Shortly after Google Play Music launched on May 15, 2013, CIO
18 Millington sent Google Engineer Chris Yerga an email congratulating him on the launch and
19 complimenting him that it had been well received. Engineer Yerga wrote back that he was a
20 fan of Sonos and that he wanted to talk about bringing Sonos and Google together with respect
21 to the new digital music service. So, that July, the parties held a meeting to discuss how
22 Google Play Music could be made available to Sonos users. At this meeting, Sonos shared its
23 hardware products and its application programming interface used to integrate digital music
24 services. More fawning followed, with Google Engineer Debajit Ghosh emailing his positive
25 feedback, telling CIO Millington that Sonos had built "an incredible product" (TX359).

26 The following year, in July 2014, the parties held another meeting at which Google
27 pitched a new collaboration — participation in the Cast for Audio program. At this meeting,
28 Google shared its vision (and a "Confidential and Proprietary" slide deck) for providing a

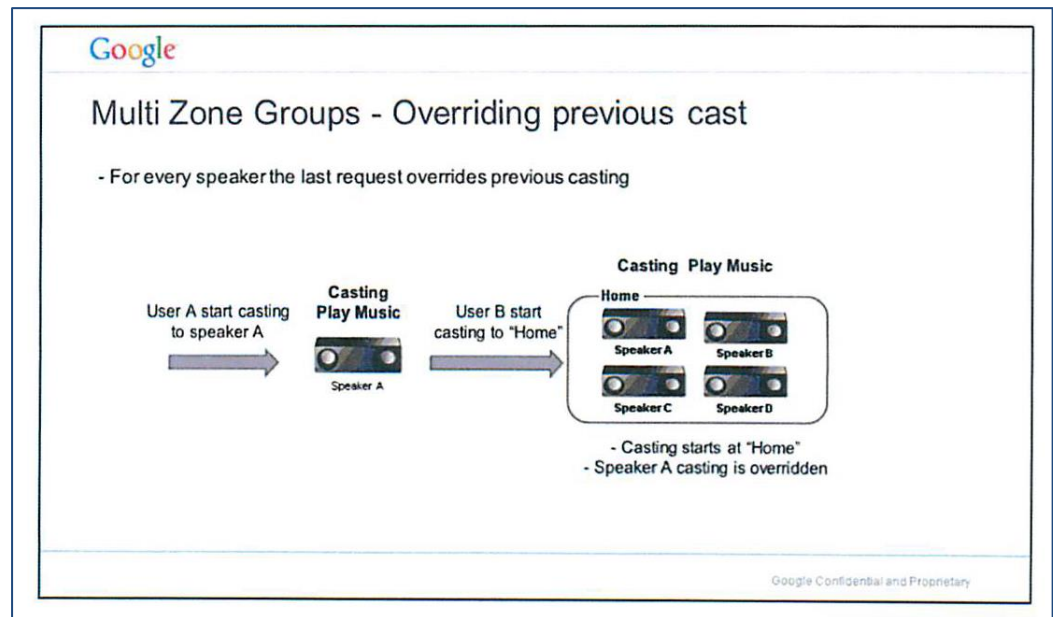
simple, standardized platform that would connect devices that played music with devices that controlled streaming apps. This stood to help audio device manufacturers used to supporting music playback from traditional sources like radio broadcast and CDs, as well as streaming companies experiencing challenges integrating their apps with the wide variety of audio devices on the market. It also stood to help consumers bearing the brunt of incompatibility — Google’s proposed program would have been cross-brand, supporting products from different manufacturers (*see* TX0125 at 3–4). Using Google’s Cast for Audio software, an audio device manufacturer like Sonos would have been able to make its devices compatible with third-party audio devices and third-party streaming apps.

Notably, in pitching Cast for Audio to Sonos, Google shared plans for a “Cast Multi-Zone feature” (TX0125 at 5). Several presentation slides focused on “Multi Zone Groups” (*id.* at 17–22). Specifically, one slide explained that each Cast for Audio device would “be a member of several groups,” *e.g.*, “1st floor” and “Parents” (*id.* at 18). In other words, Google directly revealed to Sonos its plans to create a product that would implement *customized, overlapping groups* of multimedia players:

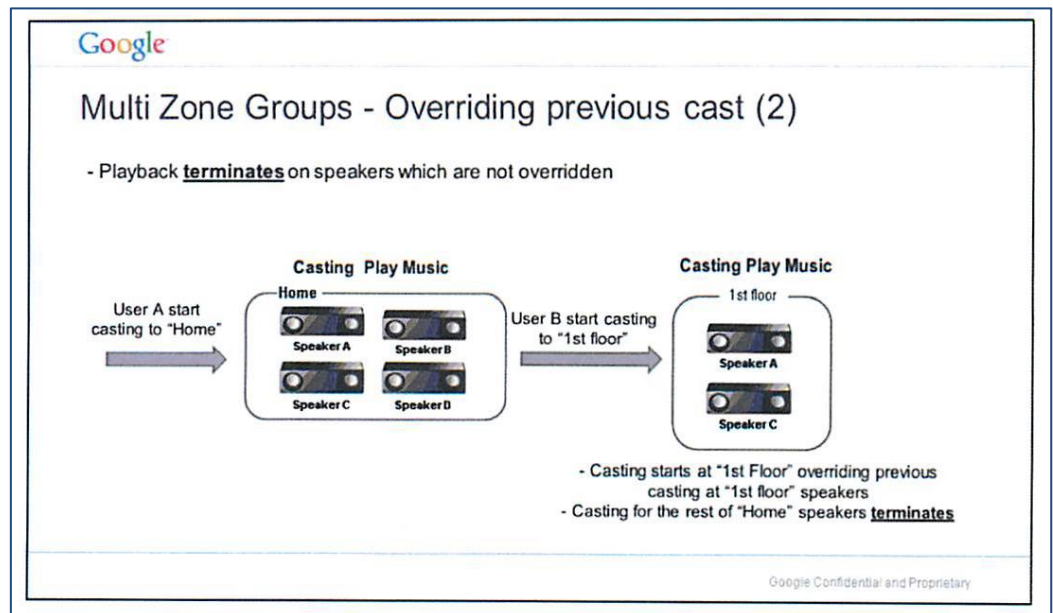


Cast for Audio Slide Deck: Customized Overlap.

(*ibid.*). Moreover, other slides showed a user continuing to play music on one multimedia player individually (e.g., “Speaker A”) before that player was invoked in a group (e.g., “Home”), and a user continuing to play music on multimedia players in one group (e.g., “Home”) before some configuration of those players was invoked in another group (e.g., “1st Floor”). In other words, Google directly revealed to Sonos its plans to create a product that would implement *saved* groups of multimedia players that could be *invoked on demand*:



Cast for Audio Slide Deck: Save & Invoke I.



Cast for Audio Slide Deck: Save & Invoke II.

(*id.* at 24–25). All told, at this meeting, Google decisively disclosed to Sonos its plans to create a product that would implement customized, saved, overlapping groups of multimedia players that could be invoked on demand — plans to practice what would become the claimed invention of the patents in suit.

Recall, at that time, Sonos products were themselves still incapable of practicing the invention. Zone players remained “smart amplifiers” hard-wired to one or more speakers; Sonos did not launch its first smart speaker until a few months after this presentation in September 2014, and it did not roll out the invention in its own products until June 2020. Sonos said nothing to Google about infringement of its patents or potential patents.

In the end, Sonos did not participate in the Cast for Audio program, which failed to materialize. But soon, as General Counsel Kwasizur explained, “we started to see big technology companies . . . showing up in our neighborhood” (Tr. 297:16–18). In December 2015, Google entered the wireless multiroom space with two new Chromecast devices. It is undisputed that these devices were released with the accused functionality. According to Sonos, they practiced the invention. In November 2016, Google launched its first smart speaker product, the Google Home, and in October 2017, it went on to launch another, the Google Home Mini. It is likewise undisputed that these products, and several other Google products that followed, were released with the accused functionality. According to Sonos, they too practiced the invention. Around this time, Amazon and Apple were also entering the fray, releasing their own smart speakers in 2017 and 2018, respectively, which presumptively were released with the accused functionality as well. Many consumers sought out products offered by Google, some on account of lower prices, others on account of voice-assistive technology and integration with the Google ecosystem.

5. THE PATENTS IN SUIT.

In order for a patent holder to claim priority to a provisional application, it must claim priority to an intermediate non-provisional continuing application that is copending, *i.e.*, not yet patented or abandoned. Although the April 2019 applications for the patents in suit were not themselves copending with the September 2006 provisional application, they were

1 copending with the September 2007 non-provisional application that claimed priority to it
2 through a daisy chain of continuation applications. A pattern developed. Just before a patent
3 would issue, Sonos would file another continuation application to keep the daisy chain alive.⁴

4 By November 2018, Sonos had three “zone scene patents” — the ’853 patent, which
5 issued on July 9, 2013; United States Patent No. 8,843,228, which issued on September 23,
6 2014; and United States Patent No. 9,344,206, which issued on May 17, 2016. It had yet to
7 assert any of them. Those patents did not claim overlapping zone scenes. And, recall, zone
8 scenes were already disclosed by the prior art. As such, those patents claimed niche variations
9 of little consequence. For example, in the reasons for allowance of the ’206 patent, the patent
10 examiner observed that “[t]he prior art does not reasonably teach a loudspeaker system
11 wherein a first independent playback device in the form of a networked loudspeaker or
12 networked master loudspeaker is polled or subject to discovery to determine a zone scene
13 configuration or plurality thereof” (Notice of Allowance, Jan. 20, 2016).

14 Sonos also had a further application pending, which served as the parent application for
15 the patents in suit. This application ultimately issued after them as United States Patent
16 No. 11,388,532 on July 12, 2022. On November 14, 2018, however, Sonos had just received a
17 final rejection of that application from the PTO, once again on account of the Yamaha DME
18 prior art. This was the same prior art that had been relied upon by the same patent examiner in
19 initially rejecting all of the parent applications in the family.

20 According to the patent examiner, Yamaha “DME cause[d] an indication to be displayed
21 which [wa]s provided by the utility of an open or new command sufficient to open or create a
22 zone scene for instantiation on the plurality of playback devices” and “a particular
23 configuration of players” (Final Rejection, Nov. 14, 2018, at 5). He observed that this was
24 “substantially similar to the disclosed invocation of a scene such as upon the instant disclosed
25 players upon the event of a stored alarm configuration,” which, the “Examiner must point
26

27 ⁴ In fact, it remains alive today. There is a pending application, filed one day before the parent
28 application of the patents in suit issued as its own patent, sixteen years after the provisional
application (*see* United States Patent Application No. 17/861,882).

1 out . . . [was] the extent of the indication disclosed by the [preceding] applications” (*id.* at 6).
2 The examiner then emphasized that “it would have been obvious to one of ordinary skill in the
3 art on or before the effective priority date of the instant application to operate the DME
4 disclosed displayed selectable indicators to cause one or more zone scenes to be invoked on
5 two or more playback devices,” “[a]s this would comprise no more than a choice between a
6 finite number of identified predictable solutions” (*id.* at 7). According to the patent examiner,
7 based on the Yamaha DME prior art, it would have been obvious to customize, save and
8 invoke groups of zone players on demand. Zone scenes remained obvious.

9 To get around this, and to secure patents that would read on the products of the big
10 technology companies who had shown up in the neighborhood, Sonos reframed the invention it
11 attempted to claim in the ’532 patent. On March 21, 2019, in a request for reevaluation, Sonos
12 for the first time made the argument that the Yamaha DME prior art had not disclosed
13 customizing, saving, and later invoking *overlapping* zone scenes, “wherein the zone
14 configuration data characterizes two or more zone scenes, wherein a first zone scene identifies
15 a first group configuration *including the first independent playback device and a second*
16 *independent playback device*, and wherein a second zone scene identifies a second group
17 configuration *including the first independent playback device but not the second independent*
18 *playback device*” (Remarks Made in Amendment, Mar. 21, 2019, at 8–9). Sonos concurrently
19 amended the claim language to refer to “two or more” zone scenes instead of “at least one”
20 (Claims, Mar. 21, 2019; *see, e.g., id.* at 2).

21 Then, on April 12, 2019, less than a month after filing its request for reevaluation and
22 amendment of the application for the ’532 patent, Sonos filed the continuation applications for
23 the patents in suit, the ’885 and ’966 patents (TX003; TX001). Unlike the prior applications in
24 the family, these two applications were filed “Track One” for prioritized (expedited)
25 examination, and they were filed with a combined 70,000 pages of disclosures — even though
26 the patent examiner’s rejections had only rested on one prior art publication, either alone or in
27 combination with a few other prior art publications, over the course of the last thirteen years.
28 (Those disclosures explain the twenty-six pages of “References Cited” at the beginning of the

1 '885 patent, and the eighteen pages of “References Cited” at the beginning of the '966 patent.)
2 Whereas the '885 patent claimed the technology from the perspective of a zone player (*e.g.*, a
3 smart speaker), the '966 patent claimed the technology from the perspective of a computing
4 device that controlled at least three zone players (*e.g.*, a smartphone).

5 Like the other applications in the patent family, the applications for the patents in suit
6 claimed priority to the 2006 provisional application and incorporated it by reference, but they
7 also contained new abstracts that expressly highlighted overlapping zone scenes. Specifically,
8 the applications described the creation of “a first zone scene including a first preconfigured
9 grouping of zones” with a “first zone” and “second zone,” creation of “a second scene
10 including a second preconfigured grouping of zones” with a “first zone” and “third zone,” and
11 an instruction invoking one of those zone scenes that causes the zones to be “configured” for
12 synchronous playback (TX0004 at 4703; TX0006 at 43). They also included claims that
13 expressly called for groups of zone players that shared a zone and thereby attempted to claim
14 overlapping zone scenes (TX0004 at 4696–4702; TX0006 at 35–42).

15 On July 5, 2019, Sonos received non-final rejections for both of these new applications
16 from the PTO, again, on account of the Yamaha DME prior art. The patent examiner observed
17 that “while DME does not explicitly teach the inclusion, exclusion etc, of particular
18 enumerated first, second, etc. players of the set of available players to form, create, save, recall
19 etc. a particular first, second etc. grouping[,] Examiner takes official notice that the grouping
20 and sub-grouping of a constellation of audio players was well known” and that the “DME
21 system enables the practice of the claimed subject matter without undue experimentation”
22 (TX0004 at 4577; TX0006 at 3804). In other words, not only were zone scenes obvious, so
23 were overlapping zone scenes. In its response, Sonos did the following.

24 *First*, Sonos amended the *claims* of both applications to clarify that “the first zone
25 player” would operate “in a standalone mode in which” it was “configured to play back media
26 individually . . . until a given one of the first and second zone scenes has been selected for
27 invocation,” at which point it would transition out of standalone mode to play music in
28 synchrony with one or more zone players (TX0004 at 810–12; TX0006 at 4087–88; *see*

generally TX0004 at 810–20; TX0006 at 4087–4100). In essence, the standalone mode limitations provided (slightly) more detail on implementing overlap, thereby narrowing the proposed claims to evade prior art.

Second, Sonos amended the *specification and figures* of both applications (TX0004 at 808–09; TX0006 at 4085–86). Ordinarily, an applicant can only amend continuation applications to pursue new claims for subject matter previously disclosed; the idea is that, because all of the subject matter was previously disclosed in a parent application, the new claims should be entitled to that parent application’s earlier effective filing date. But 37 C.F.R. Section 1.57(g) provides for an exception. Specifically, it provides for the insertion of material incorporated by reference into the specification or drawings of a continuation application by way of amendment when that amendment is accompanied by a statement that the material being inserted is material previously incorporated by reference *and that the amendment contains no new matter*.

Pursuant to that regulation, on August 23, 2019, Sonos claimed to “insert material into the specification and figures that was previously incorporated by reference in this application” (TX0004 at 821; TX0006 at 4101). In doing so, it represented that “the amendment contain[ed] no new matter” and that “the inserted material c[ould] be found at least at pp. 5–6 and 17 of Appendix A to [the] provisional application,” “the entirety of which was incorporated by reference on the filing date of this application” (*ibid.*). Again, whether there was indeed new matter has become important here and will be addressed below.

On Sonos’s representation that its amendment to the specification and figures contained no new matter, the patent examiner allowed the amendments to the applications for the patents in suit (and the application for the ’532 patent). The ’966 patent issued on November 5, 2019, and the ’885 patent issued on November 24, 2020.

6. OUR LITIGATION.

On September 29, 2020, Sonos sued Google for patent infringement in the Western District of Texas. One day before, Google sued Sonos for declaratory relief in the Northern District of California. And, one year later, the infringement action was transferred to this

1 district at the direction of the Federal Circuit. The civil actions were related and ultimately
2 consolidated for trial.⁵

3 Originally, Sonos asserted five patents, including the '966 patent and one of its
4 predecessors, the '206 patent. But after Judge Alan Albright indicated that he was inclined to
5 find the '206 patent claims indefinite shortly before the infringement action was transferred,
6 Sonos opted to dismiss its infringement claims based on the '206 patent. It asserted the '885
7 patent instead, which had just issued.

8 Here, summary judgment motions whittled down the actions. By the time of our trial in
9 May 2023, they turned on the '885 and '966 patents. With respect to the '885 patent, Sonos
10 asserted claim 1 and accused Google media players (*e.g.*, a Google Nest Mini speaker). With
11 respect to the '966 patent, Sonos asserted claims 1, 2, 4, 6, and 8, and accused all smartphones
12 and other computing devices that have or had the Google Home app installed (*e.g.*, an iPhone
13 with the Google Home app).⁶ After an order found claim 1 of the '885 patent infringed,
14 Google implemented a redesign that it disclosed to Sonos during discovery. On account of this
15 redesign, it contended that the accused products no longer infringed the asserted claims of
16 either patent.

17 The issues tried by the jury were: (1) Sonos's claim for direct infringement of claim 1 of
18 the '885 patent with respect to the redesigned accused products, and Google's associated non-
19 infringement and invalidity defenses; (2) Sonos's claim for direct, indirect, and willful
20 infringement of claims 1, 2, 4, 6, and 8 of the '966 patent with respect to the original and
21 redesigned accused products, and Google's associated non-infringement and invalidity

22
23 ⁵ Prior orders have described the twists and turns of our entangled actions in greater detail. *See*
24 *Sonos, Inc. v. Google LLC*, No. C 20-06754 WHA, 2023 WL 2962400, at *1, 19 (N.D. Cal.
25 Apr. 13, 2023); *Sonos, Inc. v. Google LLC*, 591 F. Supp. 3d 638, 641 (N.D. Cal. 2022), *leave to*
26 *appeal denied*, 2022 WL 1486359 (Fed. Cir. May 11, 2022).

27 ⁶ At trial, contrary to Sonos's position, the judge ruled that the mere installation of the Google
28 Home app on a computing device did not itself infringe, and that Google was incapable of
infringing the '966 patent unless the accused products were networked with at least three zone
players that might be added to overlapping zone scenes using the Google Home app (Final Charge
15; Tr. 1403:5–11). It cannot be that Google would infringe on account of someone who installed
the Google Home app to control her smart lights and had no zone players, or had three *Sonos* zone
players that could not be added to zone scenes using the Google Home app.

1 defenses; and (3) damages for infringement of claim 1 of the '885 patent and, if applicable,
2 claims 1, 2, 4, 6, and/or 8 of the '966 patent. The parties stipulated, and the judge agreed, that
3 remaining affirmative defenses and injunctive relief would be evaluated by the judge after the
4 jury verdict, with each side having "14 hours [of evidence time] to present *all* of the issues to
5 be tried in this case" (Final Pretrial Order 8; *see* Proposed Final Pretrial Order 2–3, 5).

6 A unanimous jury found: (1) Google failed to prove, by clear and convincing evidence,
7 that the asserted claims of either patent were invalid; (2) Sonos proved, by a preponderance of
8 the evidence, that claim 1 of the '885 patent was infringed with respect to the redesigned
9 accused products; and (3) Sonos failed to prove, by a preponderance of the evidence, that
10 claims 1, 2, 4, 6, and 8 of the '966 patent were infringed with respect to the original and
11 redesigned accused products. As for damages, the jury found that a per-unit royalty of \$2.30
12 would adequately compensate Sonos for Google's infringement of the '885 patent, and it
13 multiplied this by 14,133,558 units to derive a \$32,507,183.50 damages award (Dkt. No. 774).

14 For reference, claim 1 of the '885 patent is included below:

- 15 **1.** A first zone player comprising:
16 a network interface that is configured to communicatively couple the first
17 zone player to at least one data network;
18 one or more processors;
19 a non-transitory computer-readable medium; and
20 program instructions stored on the non-transitory computer-readable
21 medium that, when executed by the one or more processors, cause the
22 first zone player to perform functions comprising:
23 while operating in a standalone mode in which the first zone player is
24 configured to play back media individually in a networked media
25 playback system comprising the first zone player and at least two
26 other zone players;
27 (i) receiving, from a network device over a data network, a first
28 indication that the first zone player has been added to a first zone
scene comprising a first predefined grouping of zone players
including at least the first zone player and a second zone player
that are to be configured for synchronous playback of media when
the first zone scene is invoked; and
(ii) receiving, from the network device over the data network, a
second indication that the first zone player has been added to a
second zone scene comprising a second predefined grouping of
zone players including at least the first zone player and a third zone
player that are to be configured for synchronous playback of media
when the second zone scene is invoked, wherein the second zone
player is different than the third zone player;
after receiving the first and second indications, continuing to operate in
the standalone mode until a given one of the first and second zone

scenes has been selected for invocation;
 after the given one of the first and second zone scenes has been
 selected for invocation, receiving, from the network device over the
 data network, an instruction to operate in accordance with a given
 one of the first and second zone scenes respectively comprising a
 given one of the first and second predefined groupings of zone
 players; and
 based on the instruction, transitioning from operating in the standalone
 mode to operating in accordance with the given one of the first and
 second predefined groupings of zone players such that the first zone
 player is configured to coordinate with at least one other zone player
 in the given one of the first and second predefined groupings of zone
 players over a data network in order to output media in synchrony
 with output of media by the at least one other zone player in the
 given one of the first and second predefined groupings of zone
 players.

(’885 patent 11:36–12:22).

After the jury verdict, the judge requested briefing on the remaining affirmative defenses and injunctive relief, and the parties filed renewed motions for judgment as a matter of law. Google argued, *inter alia*, that the patents are unenforceable under the affirmative defense of prosecution laches. A hearing followed. This order follows full briefing and oral argument.

ANALYSIS

Prosecution laches is an equitable affirmative defense. The doctrine may “render a patent unenforceable when it has issued only after an unreasonable and unexplained delay in prosecution that constitutes an egregious misuse of the statutory patent system under a totality of the circumstances.” *Hyatt v. Hirshfeld*, 998 F.3d 1347, 1360 (Fed. Cir. 2021) (quoting *Cancer Rsch. Tech. Ltd. v. Barr Lab ’ys, Inc.*, 625 F.3d 724, 728 (Fed. Cir. 2010)). As such, it “places an additional, equitable restriction on patent prosecution conduct beyond those imposed by statute or PTO regulation.” *Id.* at 1366. A patent applicant must “not only comply with the statutory requirements and PTO regulations but must also prosecute its applications in an equitable way that avoids unreasonable, unexplained delay that prejudices others.” *Ibid.*

To prove prosecution laches as a defense to patent infringement, an accused infringer must show: (1) the patent holder’s delay in prosecution was unreasonable and inexcusable under the totality of circumstances; and (2) the accused infringer suffered prejudice attributable to the delay. *Cancer Rsch.*, 625 F.3d at 729. With respect to the first element, the determination of unreasonable and inexcusable delay is not limited to the circumstances

surrounding the particular patent applications at issue and can include “the prosecution history of all of a series of related patents and overall delay in issuing claims.” *Symbol Techs., Inc., v. Lemelson Med., Educ. & Rsch Found., LP* (*Symbol Techs., II*), 422 F.3d 1378, 1385–86 (Fed. Cir. 2005). With respect to the second element, prejudice requires a showing of intervening rights, in that “either the accused infringer or others invested in, worked on, or used the claimed technology during the period of delay.” *Cancer Rsch.*, 625 F.3d at 729.

The Federal Circuit has not expressly clarified an accused infringer’s burden of proof for prosecution laches, so this order errs on the side of caution and applies clear and convincing evidence, consistent with what is required for other unenforceability defenses. *See, e.g., id.* at 732 (applying clear and convincing evidence for inequitable conduct); *see also Personalized Media Commc’ns, LLC v. Apple, Inc.*, 552 F. Supp. 3d 664, 684–85 (E.D. Tex. 2021) (Judge Rodney Gilstrap), *aff’d*, 57 F.4th 1346 (Fed. Cir. 2023) (applying clear and convincing evidence for prosecution laches). In the end, it makes no difference here.⁷

1. UNREASONABLE AND INEXCUSABLE DELAY.

Having considered the totality of the circumstances, this order concludes, by clear and convincing evidence, that Sonos was guilty of unreasonable and inexcusable delay in its prosecution of the patents in suit.

To recap, Sonos filed the provisional application from which the patents claim priority in September 2006, but it did not file applications for the patents in suit, with claims on overlapping zone scenes, until April 2019. Moreover, those claims were amended to include the “standalone mode” limitations in August 2019 before the applications issued as patents in November 2019 and November 2020. That was *over thirteen years* after Sonos had filed the provisional application. That was also well after Google had disclosed the claimed invention to Sonos and, on its own, brought the claimed invention to the market.

⁷ Likewise, the Federal Circuit has not expressly clarified whether the presumption that a delay of more than six years is unreasonable, inexcusable, and prejudicial applies when prosecution laches is raised as a defense to infringement, as it does when it is raised in a civil action challenging an adverse decision of the PTO. *See Hyatt*, 998 F.3d at 1369; *see also Personalized Media Commc’ns*, 552 F. Supp. 3d at 685 (declining to apply presumption). This order does not reach this question. It too makes no difference here.

1 Although the Federal Circuit has “not set forth any firm guidelines” for determining
2 when a delay in prosecution is unreasonable and inexcusable, it has “discussed precedent such
3 as *Woodbridge v. United States*, 263 U.S. 50, 44 S. Ct. 45, 68 L. Ed. 159 (1923), and *Webster*
4 *Electric Co. v. Splitdorf Electrical Co.*, 264 U.S. 463, 44 S. Ct. 342, 68 L. Ed. 792 (1924),
5 wherein the Supreme Court applied the doctrine of prosecution laches to render patents
6 unenforceable.” *Symbol Techs. II*, 422 F.3d at 1385. In these two decisions, the Supreme
7 Court found patents unenforceable based on nine-year and eight-year delays in presenting
8 claims. *See Woodbridge*, 263 U.S. at 50; *Webster*, 264 U.S. at 465. In the decision in which
9 the Federal Circuit applied prosecution laches for the first time, it likewise found patents
10 unenforceable based on an eight-year delay in presenting claims. *In re Bogese*, 303 F.3d 1362,
11 1369 (Fed. Cir. 2002). And, in its two most recent decisions affirming prosecution laches
12 determinations, the Federal Circuit found patents unenforceable based on ten-year to nineteen-
13 year delays in presenting claims. *See Personalized Media Commc’ns, LLC v. Apple Inc.*
14 *(PMC)*, 57 F.4th 1346, 1355 (Fed. Cir. 2023) (citing *Hyatt*, 998 F.3d at 1368). Here, Sonos
15 delayed thirteen years in presenting claims. “The magnitude of [Sonos’s] delay in presenting
16 [its] claims for prosecution suffices to invoke prosecution laches.” *Hyatt*, 998 F.3d at 1367.

17 Remarkably, at trial, Sonos never provided any sworn explanation for why it waited
18 until April 2019 to claim overlapping zone scenes. The only sworn explanation addressed a
19 different delay: delay in coming out with its own products that implemented overlapping
20 zone scenes, which took place in June 2020. Even crediting the testimony of Sonos’s
21 witnesses that earlier Sonos products lacked sufficient memory to practice the claimed
22 invention (*see, e.g.*, Tr. 915:20–22), that in no way explained why Sonos failed to seek
23 claims on this invention until April 2019. In other words, this testimony addressed why
24 Sonos delayed in practicing the invention, not why Sonos delayed in patenting it.

25 Meanwhile, the thrust of Sonos’s explanation in its post-trial brief is that it diligently
26 prosecuted the family of patent applications in the interim: from September 2006, when it
27 filed a provisional application that allegedly disclosed the invention; through September
28 2007, when it filed a corresponding non-provisional application that allegedly disclosed the

1 invention; through May 2013, August 2014, and April 2016, when it filed additional non-
2 provisional applications that incorporated those earlier applications by reference; all the way
3 up to April 2019, when it filed the applications for the patents in suit that claimed the
4 invention (*see* Opp. 6). In other words, Sonos emphasizes that it complied with the statutory
5 requirements and PTO regulations. Yet a patent applicant must “not only comply with the
6 statutory requirements and PTO regulations but must also prosecute its applications in an
7 equitable way that avoids unreasonable, unexplained delay that prejudices others.” *Hyatt*,
8 998 F.3d at 1360 (citation omitted). That Sonos diligently prosecuted patent applications in
9 the interim does not render the delay any less unreasonable and inexcusable. Indeed, it
10 renders the delay *all the more* unreasonable and inexcusable.

11 At all relevant times in the more than thirteen years it took for Sonos to present its
12 claims, Sonos had related applications on file. It would have been a small step for Sonos to
13 amend those applications to claim the invention. Likewise, nothing prevented Sonos from
14 filing parallel applications with new claims covering the invention. Sonos did not have to run
15 out its string of inert applications before turning to claim the invention that mattered. Indeed,
16 Sonos already had an application pending (for the ’532 patent) when it filed the applications
17 for the patents in suit.

18 Moreover, the Federal Circuit has explained that “subject matter disclosed by a patentee,
19 but not claimed, is considered dedicated to the public,” the reason being “that members of the
20 public reading a disclosure of particular subject matter are entitled, absent a claim to it, to
21 assume that it is not patented and therefore dedicated to the public.” *Eli Lilly & Co. v.*
22 *Hospira, Inc.*, 933 F.3d 1320, 1334 (Fed. Cir. 2019) (citations omitted). True, the Federal
23 Circuit has recognized an exception for subject matter “claimed in a continuation or other
24 application based on the disclosure,” *ibid.*, but it has also recognized that unreasonable,
25 inexcusable delay “is not what is contemplated by the patent statute when it provides for
26 continuation and continuation-in-part applications” and “creates an ‘adverse effect on
27 businesses that [are] unable to determine what [is] patented from what [is] not patented.’” *See*
28 *Hyatt*, 998 F.3d at 1361 (alterations in original) (quoting *Symbol Techs. II*, 422 F.3d at 1386).

As such, that an invention may have been lurking between the lines of an earlier application does not excuse a delay in presenting claims on it.

It is also true that a patent applicant is allowed to draft claims to read on competitors' products and claim a priority date that precedes them. *See Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 909 n.2 (Fed. Cir. 2004) (citing *Kingsdown Med. Consultants, Ltd. v. Hollister Inc.*, 863 F.2d 867, 874 (Fed. Cir. 1988)). But that is only so long as there is no unreasonable, inexcusable delay, and so long, of course, that an earlier specification really did disclose the claimed invention.

2. PREJUDICE.

In addition, having considered the totality of the circumstances, this order concludes, by clear and convincing evidence, that Google suffered prejudice by reason of delay by Sonos.

Again, this element requires a showing of intervening rights, in that "either the accused infringer or others invested in, worked on, or used the claimed technology during the period of delay." *Cancer Rsch.*, 625 F.3d at 729. Here, Google began investing in the accused products by at least 2015, when it released its first products that practiced the invention. Sonos never offered sworn evidence that Google suffered no economic prejudice. To the contrary, its very theory of the case presented at trial was that Google invested in building out a line of products that infringed Sonos's patents and that Google profited off this investment. There is no question that Google worked on, invested in, and used the claimed technology during the period of Sonos's delay.

In its post-trial brief, Sonos attempts to sidestep the issue by arguing that there was no prejudice because Google could have studied the tortured prosecution history dating back to 2006 before investing in infringing products (*see* Opp. 11). This argument is highly unpersuasive for several reasons.

First, unearthing the layers of file histories would have resembled an exercise in archeology. As even Sonos's own counsel acknowledged at trial, "it is, actually, a very confusing priority chain. I've seen a lot, and it's confusing" (Tr. 969:1–3). Because the 2007 non-provisional application was filed with a request for non-publication, it was not even

published until it issued in 2013 — mere months before Sonos and Google first explored a Google Play Music collaboration, and one year before the Cast for Audio presentation. Furthermore, the 2006 provisional application, by definition, *was never published*. It was made available to the public in 2013, but it was (and is) not publicly searchable like standard patents and patent applications.

Second, the earlier applications *never claimed the invention*. Claims define a patent holder's rights. "[W]e look to the words of the claims themselves . . . to define the scope of the patented invention." *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). We do not look to the specifications of much earlier related patents to define the scope of a patented invention, and we certainly do not look to an appendix to the specification of a much earlier unpublished provisional application.

Third, it turns out that the earlier applications *never disclosed the invention*. That is why Sonos had to add new matter. If Sonos itself was unable to find the disclosure in the specification prior to 2019, how could Google have been expected to find it? Sonos's machinations during prosecution, inserting new matter into the specification and masquerading it as subject matter previously disclosed, have turned out to be so important that they will be detailed separately.

Another unavailing argument Sonos raises in its post-trial brief is that there was no prejudice because Sonos had previously patented broader claims that would read on Google's products (*see* Opp. 11). But, with the exception of the '06 patent claims (that Sonos promptly withdrew upon Judge Albright's comment on indefiniteness), Sonos never asserted *any of these earlier claims*. This is telling. Those claims were, in fact, *very narrow*, with the patent examiner having repeatedly rejected any suggestion that Sonos had invented zone scenes (and having at least once rejected the suggestion that Sonos had invented overlapping zone scenes).

In sum, in considering the totality of the circumstances, including the prosecution history of the series of related patents and the overall delay in issuing claims, this order finds and concludes, by clear and convincing evidence, that Sonos was guilty of unreasonable and

1 inexcusable delay in prosecution of the patents in suit, to the extreme prejudice of Google and
2 others.

3 This order will now take up two of Sonos's arguments that do not carry the day but
4 warrant a deeper dive.

5 **3. PROSECUTION LACHES APPLIES TO POST-1995 APPLICATIONS.**

6 Much ink has been spilled by Sonos in seeking to demonstrate that the affirmative
7 defense of prosecution laches is dead (Opp. 2–3, 5–6). It is not.

8 Sonos (correctly) observes that, despite issuing comprehensive opinions expounding on
9 the doctrine of prosecution laches in recent years, and even as recently as a few months ago,
10 the Federal Circuit has yet to affirm the application of this defense to patent applications
11 originally filed after 1995. Needless to say, if the doctrine were dead with respect to
12 applications filed after 1995, it would have been easy for the Federal Circuit to say so in
13 opinions it issued after 1995. And, the Federal Circuit has *only* affirmed the application of
14 prosecution laches *after* 1995 (in 2023, 2021, 2005 and 2002). *See PMC*, 57 F.4th at 1350;
15 *Hyatt*, 998 F.3d at 1370; *Symbol Techs. II*, 422 F.3d at 1385; *In re Bogese*, 303 F.3d at 1363.
16 Meanwhile, the defense was only endorsed by the Federal Circuit as a grounds for challenging
17 patent enforceability *after* 1995 (based on Supreme Court precedent from a century ago).
18 *Symbol Techs. v. Lemelson*, 277 F.3d 1361, 1364–68 (Fed. Cir. 2002).

19 So why 1995? Essentially, Sonos contends that prosecution laches lost its luster that year
20 because that was when the United States moved from a patent term of 17-years-from-issuance
21 to a patent term of 20-years-from-filing, thereby reducing the incentive to delay the issuance of
22 a “submarine patent” that surfaces unexpectedly and catches competitors off guard. Because
23 the '885 and '966 patents claim priority to a 2006 provisional application through a 2007 non-
24 provisional application, Sonos ostensibly “did not (and could not) ‘postpone’ its patent
25 monopoly by delaying filing its patent applications” for the patents in suit (Opp. 5). According
26 to Sonos, “[p]rosecution laches developed to thwart the ‘practice’ of ‘deliberately and without
27 excuse postpon[ing] beyond the date of the actual invention, the beginning of the term of [the
28 patentee’s] monopoly,’” and “that practice was a relic of the pre-1995 patent system” (*ibid.*

(quoting *Hyatt*, 998 F.3d at 1360)). In support, Sonos selectively quotes the Federal Circuit’s 2021 opinion in *Hyatt*, which itself quotes the Supreme Court’s 1923 opinion in *Woodbridge*. But that 1923 decision, a forebearer of the prosecution laches defense, was not so circumscribed. Nor was *Hyatt*’s reading of it, for that matter.

As the Federal Circuit explained in *Hyatt*, *Woodbridge* “held that, by delaying to ‘mak[e] the term of the monopoly square with the period when the commercial profit from it would have been highest,’ [the patent holder] ‘forfeit[ed] the right to a patent by designed delay.’” *Hyatt*, 998 F.3d at 1360 (quoting *Woodbridge*, 263 U.S. at 56). The Supreme Court recognized that this delay improperly “postpon[ed] the time when the public could freely enjoy [the invention] for nearly 10 years.” *Woodbridge*, 263 U.S. at 56. Likewise, in *Webster*, a decision that issued the following year, the Supreme Court held that the patent claims first presented to the PTO following an eight-year delay reflected “an undue extension of the patent monopoly against private and public rights” and rendered the underlying patent unenforceable. *See Webster*, 264 U.S. at 466. In establishing the defense of prosecution laches, the Supreme Court was less concerned with the nuances of patent term duration and more concerned with manipulation of patent monopoly for profit at the expense of public enjoyment. And that is precisely what this Court is concerned with here.

Sonos waited over *thirteen years* to patent the invention. Although this did not delay the priority date, it did “postpone[] beyond the date of the actual invention[] the beginning of the term of [Sonos’s] monopoly.” *Woodbridge*, 263 U.S. at 56. There simply *was no monopoly* on the claimed invention until the patents issued in 2019 and 2020. Having conceived of the claimed invention in 2005 (as stipulated), having known that Google planned to release a product that practiced it as early as 2014, and having known that Google, in fact, released products that practiced it as early as 2015, Sonos undertook “designed delay.” It imposed limitations on the public’s right to practice the invention after the fact, at considerable expense to Google, other companies, and consumers. Sonos thereby made the term of its patent monopoly “square with the period when the commercial profit from it would be highest” —

1 after Google and others had put the invention into practice and Sonos had sustained
2 “damages.” *Ibid.*

3 Just this year, the Federal Circuit rejected an argument that a district court committed
4 legal error in finding unreasonable and inexcusable delay because the “conduct look[ed]
5 nothing like *Hyatt* or the handful of other cases that have found prosecution laches.” *PMC*,
6 57 F.4th at 1354. One can anticipate the same argument being made on appeal here. In
7 rejecting the argument, the Federal Circuit emphasized that prosecution laches is a “flexible
8 doctrine.” *Ibid.* True, our patents are not the “submarine patents” of yesteryear, but they
9 likewise issued after many years of lurking beneath the surface, catching competitors off
10 guard. Sonos let the industry develop and only then sought to extract an invention from a
11 much earlier application that would read on an industry trend. It is worse than that, actually,
12 for Sonos learned of Google’s specific product plans and *still waited five years* to frame claims
13 to read on those products. A patent holder may only need a short (seven-year) term to extract a
14 substantial (thirty-two-million-dollar) damages award.

15 Sonos has done exactly what the Supreme Court has long said should not be done. “It
16 will not do for the patentee to wait until other inventors have produced new forms of
17 improvement, and then, with the new light thus acquired, under pretence of inadvertence and
18 mistake, apply for such an enlargement of his claim as to make it embrace these new forms.”
19 *Miller v. Bridgeport Brass Co.*, 104 U.S. 350, 355 (1881). As the Supreme Court explained in
20 reference to reissues, “the rule of laches should be strictly applied; and no one should be
21 relieved who has slept upon his rights, and has thus led the public to rely on the implied
22 disclaimer involved in the terms of the original patent.” *Ibid.* So too here.

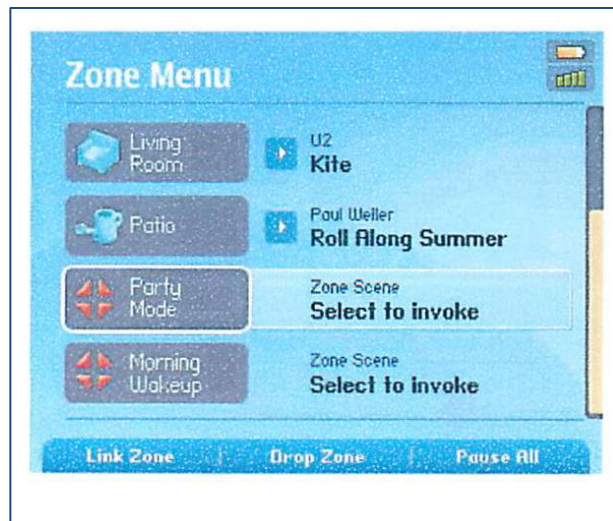
23 **4. NO DISCLOSURE IN ORIGINAL APPLICATIONS.**

24 This order now turns to the details of a point made above — namely, that contrary to
25 Sonos’s position, the 2006 provisional application and the 2007 non-provisional application
26 actually failed to disclose the invention. The truth is that Sonos did not so much as adumbrate,
27 let alone disclose, the claimed invention *in any of its filings prior to 2019*.
28

In essence, Sonos's position is that because both sides agree the UI documents disclosed the claimed invention, and the UI documents were appended to the provisional application as appendices, the provisional application disclosed the claimed invention. And, because the provisional application disclosed the claimed invention, and all subsequent non-provisional applications incorporated the provisional application by reference, all subsequent non-provisional applications disclosed the claimed invention (*see* Opp. 10).

As it turns out, however, this reasoning falls apart upon examination. The UI documents were *not* annexed to the provisional application as appendices. Rather, *altered versions of the UI documents* were annexed to the provisional application as appendices. Therein lies the rub.

Recall, the original zone scenes UI document *explicitly disclosed* zone scenes, *i.e.*, customized, saved groups of zone players that could be invoked on demand. For example, in the section on “Invoking a Scene,” a “Party Mode” zone scene and a “Morning Wakeup” zone scene were displayed next to each other in one instance, and a “Party Mode” zone scene, a “Wakeup” zone scene, and a “Garden Party” zone scene were displayed next to each other in another. The visuals are now included below for reference:



Original Zone Scenes UI Document: “Party Mode” and “Morning Wakeup” Zone Scenes.



Original Zone Scenes UI Document: “Party Mode,” “Wakeup,” and “Garden Party” Zone Scenes.

(TX6545 at 5–6). And, the original UI documents *implicitly disclosed* overlapping zone scenes by reference to party mode in the Sonos 2005 prior art system. Specifically, the original alarm clock UI document stated that “‘Party Mode’ that currently ships with the product is one example of a Zone Scene” (TX6544 at 27). The original zone scenes UI document similarly referred to the “current Party Mode setting” and represented “Party Mode” as a “Zone Scene” in various figures (TX6545 at 2, 5–6). Accordingly, when the original zone scenes UI document showed a “Party Mode” zone scene next to the “Morning Wakeup” zone scene, and a “Party Mode” zone scene next to “Wakeup” and “Garden Party” zone scenes, it would have been understood that these zone scenes would overlap because it would have been understood

that the “Party Mode” zone scene would group all of the zone players in a system. As such, the original UI documents implicitly disclosed customized, saved, *overlapping* groups of zone players that could be invoked on demand — *i.e.*, the claimed invention. Both sides stipulated that the original UI documents conceived of the claimed invention but dispute whether the 2006 provisional application and the 2007 non-provisional application disclosed the invention (thereby reducing it to practice).

Importantly, before the UI documents were appended to the provisional application as appendices, *certain language was omitted*. What was omitted? Crucially omitted was *all language describing party mode in the Sonos 2005 prior art system as a zone scene*. The relevant excerpts of the original UI documents with the highlighted language showing omissions are reproduced below:

‘Party Mode’ that currently ships with the product is one example of a Zone Scene.

Alarm Clock UI Document, Language Omitted from Appendix B Highlighted.

The Zone Scene feature allows the user to arrange the zones into groups using one single command. This is similar to the current Party Mode setting that is available. However, the Zone Scene feature is much more flexible and powerful.

Zone Scenes UI Document, Language Omitted from Appendix A Highlighted.

(TX6544 at 27; TX6545 at 2).

The provisional application specification likewise did not mention party mode as a zone scene. Instead, it advanced the idea that zone scenes were an invention, stating, for example, that “a set of zones . . . dynamically linked together using one command[] [u]sing what is referred to as a zone scene or scene” was inventive (TX2651 at 22). The provisional application specification also explained that “[o]ptionally, a system may be supplied with a command that links all zones in one step” and that “[t]his may be a simple form of a zone scene” (*ibid.*).

Significantly, Sonos’s deletion of the highlighted language in turn *omitted its (implicit) disclosure of overlapping zone scenes*. The public (and the patent examiner) would have had no way of knowing what party mode meant in Appendix A.⁸ Accordingly, when Appendix A showed a “Party Mode” zone scene next to the “Morning Wakeup” zone scene — and a “Party Mode” zone scene next to “Wakeup” and “Garden Party” zone scenes — it no longer would have been understood that these zone scenes would overlap because it no longer would have been understood that the “Party Mode” zone scene would group all of the zone players in a system. The sentences needed to understand this were omitted. As such, as the provisional application did not disclose customized, saved, *overlapping* groups of zone players that could be invoked on demand — *i.e.*, the claimed invention.

Why did Sonos omit this language? Party mode in the Sonos 2005 prior art system *was what was described as inventive* in the 2006 provisional application specification. It was “a set of zones [that] can be dynamically linked together using one command[.]” with a “predefined zone grouping” (TX2651 at 21). Sonos, no doubt, saw the risk that its own product — the Sonos 2005 prior art system, released in January 2005 — would have served as invalidating prior art for a broad zone scene patent.⁹

At trial, Inventor Lambourne suggested that language from the original UI documents describing party mode as it existed in the Sonos 2005 prior art system as a zone scene was untrue and never should have been there:

⁸ For example, “party mode” was also discussed at summary judgment in these very actions to mean something entirely different in relation to Google prior art. *See Sonos, Inc. v. Google LLC*, No. C 20-06754 WHA, 2023 WL 2962400, at *6–12 (N.D. Cal. Apr. 13, 2023).

⁹As Sonos explained in a post-trial brief, “under pre-AIA [35 U.S. Code Section] 102(b), a reference qualifies as prior art if it was . . . ‘in public use or on sale’ in the United States more than one year prior to a patent’s effective filing date This ‘one year prior’ date is commonly referred to as the patent’s ‘critical date’ [T]he ‘critical date’ for purposes of pre-AIA [Section] 102(b) (*i.e.*, the date that is one year before the effective filing date) is September 12, 2005, and any alleged reference that precedes that critical date will qualify as prior art under pre-AIA [Section] 102(b) regardless of conception date” (Dkt. No. 809 at 2, 4). Based on the claimed priority date of September 12, 2006 (the filing date of the 2006 provisional application), the Sonos 2005 prior art system, released in January 2005, is pre-AIA Section 102(b) prior art.

1 Q. Do you see kind of in the middle of the screen, the middle of
2 the page here there's a sentence that says, "Party Mode that
3 currently ships with the product is one example of a zone scene"?

4 A. Yes . . .

5 Q. Sitting here today, do you believe that to be a true statement?

6 A. No.

7 Q. So, if it's not true, why did you write it?

8 A. These were some notes that I added to the end of a spec that
9 was sort of — the main body of the spec was previous pages. I
10 used the — I used the description imprecisely. I think if I was to
11 write — could write it again I wouldn't have used the word zone
12 — Party Mode as an example of zone scene there.

13 (Tr. 462:16–20, 463:2–11).¹⁰ This order rejects the explanation as not credible and finds that
14 the omitted language was accurate and left out for the reason stated above.

15 The excising of party mode from the UI documents perhaps helped Sonos then, but it
16 hurts Sonos now because it excised the only basis for finding the 2006 provisional application
17 disclosed overlap. Accordingly, this order finds and concludes that the claimed invention was
18 *not disclosed* by the 2006 provisional application. And, because it was not disclosed by the
19 2006 provisional application, it was not disclosed by the 2007 non-provisional application and
20 the subsequent continuation applications by virtue of their incorporating by reference the 2006
21 provisional application. Sonos was too clever by half.

22 * * *

23 Sonos also contends that, irrespective of what was in the 2006 provisional application,
24 the claimed invention was disclosed in the 2007 non-provisional specification, which was
25 likewise incorporated by reference into all of the subsequent continuation applications. The

26 ¹⁰ Inventor Lambourne then suggested that the original zone scenes UI document had "more clear
27 descriptions, more accurate descriptions of zone scenes" (Tr. 453:15–17). But, as discussed, there
28 was no language in the original zone scenes UI document stating that "Party Mode," as it appears
in that document, did not operate like "the current Party Mode setting that [was] available"
(TX6545 at 2). Specifically, the document observed that the "Zone Scene feature" was "similar to
the current Party Mode" but "more flexible and powerful" (*ibid.*). That did not mean, however,
that "Party Mode," as it appeared in that document, was itself "more flexible and powerful" than
the "current Party Mode" (*ibid.*).

judge has reviewed all of the passages that Sonos contends disclosed the claimed invention (including those in a 56-page trial brief) and now disagrees. Here too, there was no disclosure of *overlapping* zone scenes whatsoever — only zone scenes generally, like in the 2006 provisional application.

In some instances, Sonos points to language describing *individual* zone scenes. The 2007 non-provisional specification described “form[ing] respective groups, *each* of which is set up *per a scene*,” *i.e.*, a “Simple Scene” in the original zone scenes UI document (Dkt. No. 723 at 26 (quoting ’853 patent 2:40–41); *id.* at 31 (quoting ’853 patent 1:54–66)) (emphasis added). It also described “*a scene* creat[ing] separate groups of zones,” *i.e.*, an “Advanced Scene” in the original zone scenes UI document (Dkt. No. 723 at 28–29 (quoting ’853 patent 8:29–47)) (emphasis added). But in describing *individual* zone scenes, the specification never disclosed *overlapping* zone scenes.

In other instances, Sonos claims support for disclosure through mixing and matching distinct embodiments, combining one that disclosed a zone scene that “links all zones” with another that separately disclosed a zone scene that links some zones (Dkt. No. 723 at 27–28 (quoting, *e.g.*, ’853 patent FIG. 3A, FIG. 3B, 8:52–60, 9:1–15)). A claimed invention is hardly disclosed “by picking and choosing claim elements from different embodiments that are never linked together in the specification.” *Flash-Control, LLC v. Intel Corp.*, No. 20-2141, 2021 WL 2944592, at *4 (Fed. Cir. July 14, 2021). Moreover, *the Sonos 2005 prior art system also disclosed linking all zones and, separately, linking some zones*. Mixing and matching, therefore, shows nothing more than what the prior art already showed.

Further, Sonos looks to the disclosure in the description of the problem solved: that it was “difficult for the traditional system to accommodate the requirement of dynamically arranging the ad hoc creation and deletion of groups” (Dkt. No. 723 (quoting ’853 patent 1:59–2:17)). With the power of hindsight, Sonos proceeds to clarify the problem as “each time a user created a new group with the ‘den’ player, the previous group with the ‘den’ player would be destroyed” (*id.* at 31). But *the specification itself* proceeded to clarify the problem as “the audio players have to be adjusted one at a time” and “there is a need to individually or

1 systematically adjust the audio volume of the audio players” (’853 patent 2:7–10). Which is to
 2 say, *overlapping* zone scenes was not the required solution. The required solution was simply
 3 *zone scenes*, with audio players “readily grouped” instead of linked one by one, and with “the
 4 players in a scene react[ing] in a synchronized manner” (*id.* at 2:6, 26–27).

5 Finally, Sonos focuses on Figure 6, which “shows a flowchart or process of providing a
 6 player theme or a zone scene for a plurality of players, where one or more of the players are
 7 placed in a zone” (’853 patent 9:59–61; *see id.* at FIG 6). In that flowchart, included below,
 8 there is an arrow after “save the scene with parameters” leading back up to “configure a zone
 9 scene.” But there is no indication that a zone player that is already a member of a saved zone
 10 scene would be available for inclusion in a subsequent one. Indeed, the specification *teaches*
 11 *against this*, explaining that “[t]he user may be given an interface to select *four of the ten*
 12 *players* to be associated with the scene” (*id.* at 10:3–4).

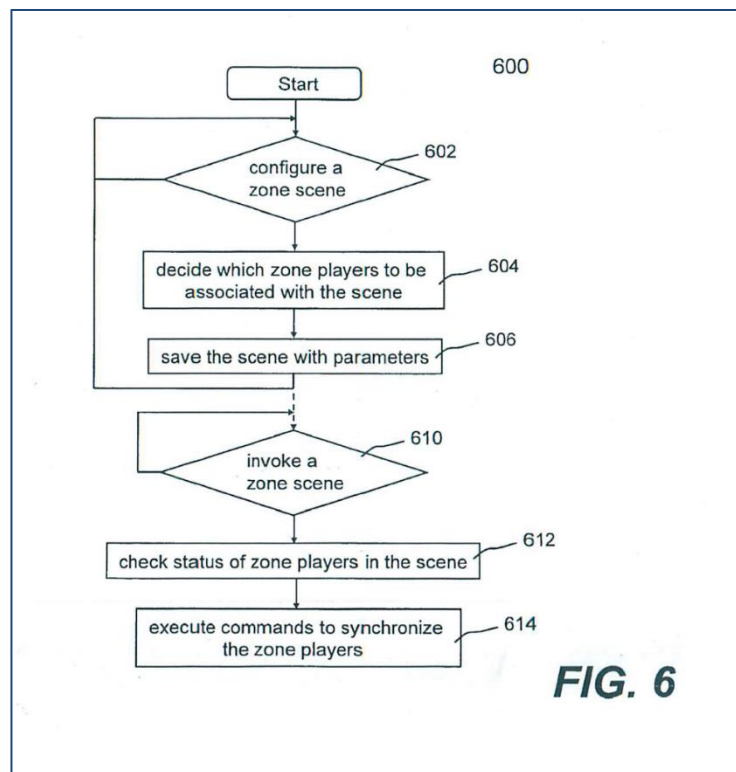


Figure 6 from 2007 Non-Provisional Application
 (and Patents in Suit).

In sum, Sonos did not disclose the claimed invention in the 2006 provisional application, the 2007 non-provisional application, or any of the subsequent continuation applications by virtue of their incorporation by reference prior to 2019.

5. THE NEW MATTER.

So where *was* the claimed invention disclosed? When the judge inquired at trial, upon realizing that “the heart of the case is the overlapping,” Sonos pointed to a passage in the specification of the patents in suit (the italicized sentence being the critical disclosure):

FIG. 5B shows another user interface **520** to allow a user to form a scene. The user interface **520** that may be displayed on a controller or a computing device, lists available zones in a system. *The list of zones in the user interface 520 includes ALL the zones in the system, including the zones that are already grouped.* A checkbox is provided next to each of the zones so that a user may check in the zones to be associated with the scene.

(Tr. 659:15–22, 662:6; ’885 and ’966 patent 10:12–19).

Counsel for Sonos had represented, and Sonos witnesses proceeded to represent, that the specification of the patents in suit was identical to the specification of the earlier applications. Specifically:

- Counsel for Sonos stated that the specification of the patents in suit “ha[d] an initial sentence in the very first [*sic*] that says this application claims priority to such and such an application. Other than that, no changes” (Tr. 656:15–22).
- Sonos Expert Dr. Kevin Almeroth testified that the patents in suit “date[d] back over time where patents were filed with the same specification and they ha[d] different sets of claims at the end. But the description of the invention, what the specification [was], the columns in it, the figures, that’s all the same” (Tr. 676:25–677:5).
- General Counsel Kwasizur proffered testimony that referred to the “patents in the zone scene family” as “patents that ha[d] the same specification as both the asserted patents in this case” (Dkt. No. 705 at 3). Meanwhile, her supporting declaration explained that the 2007 non-provisional application issued as a patent that “share[d] a substantively identical specification to the zone patents at issue in this case” (Dkt. No. 705-1 ¶ 8).

But, this was not true, as counsel for Sonos later confessed:

I need to apologize for a clarification. You and I had a discussion yesterday about the specification in this case and whether it’s the same, and I said it was the same, and that’s true insofar as there’s

an incorporation by reference in the specification to the provisional.

However, the specification has changed in slight ways as the applicant has amended the specification over the years to bring in things from the provisional, which is perfectly permissible under Rule 57(g). I just thought I should bring that up.

(Tr. 748:6–16). Yes, he should have brought that up. But even this was misleading. It later turned out that the sentence (italicized above) that Sonos had directed the judge to in order to support disclosure of the claimed invention *did not appear* in the 2007 non-provisional application specification. Rather, it was *added during prosecution in August 2019 by way of amendment* — mere months after the applications for the patents in suit were filed — with a statement that this material was previously incorporated by reference in this application and this amendment contained no new matter. That prosecution statement identified specific pages of Appendix A to the 2006 provisional application where the inserted material could be found (TX0004 at 821; TX0006 at 4101).

In fact, this was the very same sentence that the judge had earlier used as his primary evidence in finding written description support for overlap at summary judgment last year. Sonos had moved for summary judgment of infringement of claim 1 of the '885 patent. Google had opposed and cross-moved for summary judgment of invalidity of that claim, asserting, *inter alia*, that it lacked written description support. Sonos, in reply, had directed the judge to the sentence:

[T]he '885 Patent discloses that when a user is selecting which “zone players” to add during setup of each “zone scene,” the user is presented with “ALL the zones in the system, including the zones that are already grouped” – which conveys to a POSITA that each “zone scene” being set up can include any grouping of “zone players” in a multi-zone audio system, regardless of whether the “zone players” are included in any other “zone scenes” and thus that multiple “zone scenes” with one or more overlapping “zone players” can be set up and exist at the same time.

(Dkt. No. 273-4 at 9 (citing '885 patent 10:12–19, 10:4–6; 10:36–42; Ex. R, ¶ 47)).

At that time, neither party informed the judge that this very passage had been inserted by way of amendment in August 2019. As the judge explained at trial upon learning this, “I ruled for Sonos specifically [calling] out a sentence in the specification that was served up by Sonos

1 to say there was an adequate written description,” “I did not realize that that came in later by
2 amendment,” and “[t]hat would have made a difference to me if I had known that”
3 (Tr. 1410:16–20). Put another way, “I got a half a deck of cards” and “I was not told the
4 complete truth” (Tr. 2023:1–2).

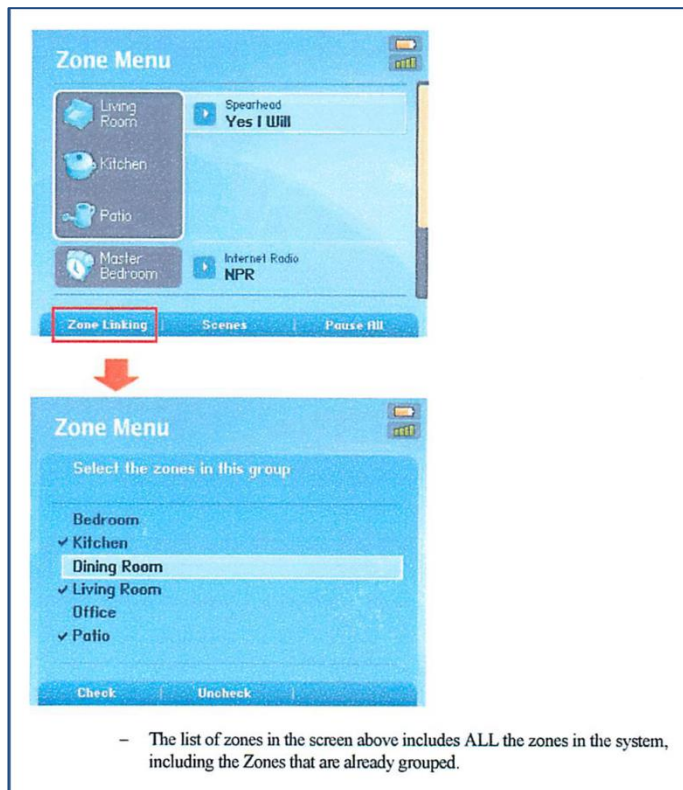
5 It is axiomatic under patent law that new matter cannot be added to a continuation
6 application’s specification. *See Pfizer, Inc. v. Teva Pharms. USA, Inc.*, 518 F.3d 1353, 1361
7 (Fed. Cir. 2008) (citing *Asseff v. Marzall*, 189 F.2d 660, 661 (D.C. Cir.1951)). That
8 application inherits a parent application’s priority date and is limited to that parent
9 application’s disclosure. Likewise, a patent may claim the benefit of a provisional application
10 only if it “relies on subject matter . . . that is present in and supported by its provisional.” *See*
11 *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1377 (Fed. Cir. 2015)
12 (citation omitted). If a patent applicant adds new matter to a continuation application, it is not
13 entitled to claim the benefit of an earlier application.

14 According to Sonos, it properly amended the specification under 37 C.F.R. Section
15 1.57(g), which provides for “insertion of material incorporated by reference into the
16 specification or drawings of an application . . . by way of an amendment to the specification or
17 drawings” so long as it is “accompanied by a statement that the material being inserted is the
18 material previously incorporated by reference and that the amendment contains no new
19 matter.” Sonos asserts that it provided such a statement to the patent examiner, the inserted
20 material was material previously incorporated by reference (with the entire provisional
21 application), and the inserted material contained no new matter since it came from Appendix A
22 to the 2006 provisional application (*see, e.g.*, Dkt. No. 723 at 18). Alas, not so.

23 Again, the critical sentence inserted in 2019 is italicized below:

24 FIG. 5B shows another user interface **520** to allow a user to form a
25 scene. The user interface **520** that may be displayed on a controller
26 or a computing device, lists available zones in a system. *The list of*
27 *zones in the user interface 520 includes ALL the zones in the system,*
28 *including the zones that are already grouped.* A checkbox is
provided next to each of the zones so that a user may check in the
zones to be associated with the scene.

(’885 and ’966 patent 10:12–19). Contrary to Sonos’s position, the descriptive sentence inserted into the specification of the patents in suit was *not* the same as that included in Appendix A and the original zone scenes UI document. “The list of zones in the screen above . . .” became “The list of zones in the *user interface 520*” (compare TX6545 at 17, with ’885 and ’966 patent 10:15). The use of the reference number “**520**” indicated that the sentence was describing Figure 5B. And, Figure 5B was *not* the diagram that this sentence had described in Appendix A and the original zone scenes UI document. Rather, Figure 5B was a truncated version of that diagram, reappropriated to show “another user interface **520** to allow a user to form a scene” — *despite the fact that the Appendix A image, we know now, had not shown forming a zone scene at all.*



“Zone Linking” from Appendix A to Provisional Application (and Original Zone Scenes UI Document).

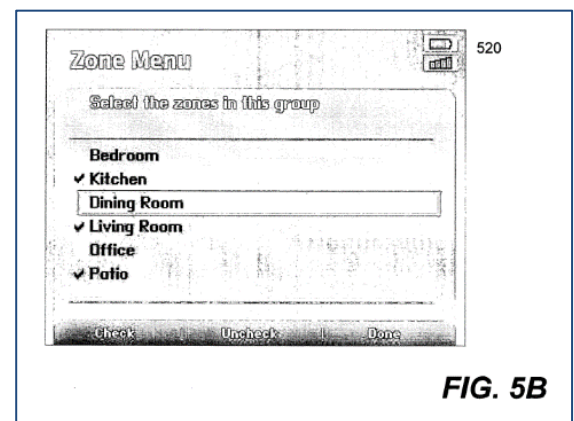


FIG. 5B

Figure 5B from Patents in Suit.

Recall, Appendix A and the original zone scenes UI document had described “Zone Linking” as distinct from “Scene Setup.” Indeed, Appendix A and the original zone scenes UI document *expressly stated* that it was “not expected that the Zone Scenes should be set up using the Handheld Controller,” like what Figure 5B ostensibly shows.

In Appendix A and the original zone scenes UI document, the descriptive sentence stating that “the list of zones in the screen above includes ALL the zones in the system, including the zones that are already grouped,” explained how this “Zone Linking” feature “would allow the user to link and drop multiple zones in one screen” on an ad hoc basis using a handheld controller, “check[ing] Zones that will be a part of a zone group, and uncheck[ing] those that won’t” (TX6545 at 17–18). This referred to ad hoc grouping — nimbler ad hoc grouping than what was available in the Sonos 2005 prior art system, but ad hoc grouping all the same. The descriptive sentence had *nothing to do with zone scenes*. Zone scenes were discussed elsewhere in both Appendix A and the original zone scenes UI document, and accessed using a distinct soft button. The old sentence was given a new and different meaning. It had referred to ad hoc grouping, but Sonos reappropriated it to refer to zone scenes. It was, therefore, new matter. Sonos’s reappropriation was “a clear abuse of the PTO’s patent examination system, which may alone suffice to satisfy the prejudice requirement of prosecution laches.” *Hyatt*, 998 F.3d at 1370.¹¹

¹¹ There were other manipulations as well. As observed by Google, submitting over 70,000 pages of largely superfluous disclosures across the patents in suit while requesting prioritized examination “created a perfect storm” to overwhelm the PTO (Br. 8 (quoting *Hyatt*, 998 F.3d at 1368)). Again, this was hardly diligent prosecution. Sonos could have filed “Track One” applications as early as 2011, and it could have filed the bulk of those largely superfluous disclosures even earlier. What’s more, in prosecuting patent family applications, Sonos often submitted superfluous disclosures after receiving a notice of allowance, adding work for the patent examiner and further delaying the date of issuance until Sonos could craft a new continuation application and keep its daisy chain of continuation applications alive. The application for the ’532 patent, the parent application of the patents in suit, received *ten additional notices of allowance* before it issued (well over a year after receiving its first such notice). The ’885 patent likewise received several notices of allowance; having initially issued around the same time as the ’966 patent, Sonos proceeded to file a Request for Continued Examination on November 18, 2019. Many of the superfluous disclosures submitted to the PTO were documents from this very litigation. One of the firms representing Sonos here also represented Sonos in the prosecution of these patents.

Sonos claimed the priority date of the 2006 provisional application because the inventive subject matter was ostensibly disclosed by that application. But here, this subject matter could not have been disclosed until 2019, when the reappropriated sentence was strategically and deceptively added to the specification of the patents in suit. “The disclosure of a continuation application must be the same as the disclosure of the prior-filed application; *i.e.*, the continuation must not include anything which would constitute new matter if inserted in the original application.” MPEP § 211.05 (9th ed. Rev. 7.2022, Feb. 2023). Otherwise, it is not entitled to the priority date of the prior-filed application. When new matter is added to a specification of a continuation application by way of amendment, the effective filing date should be the date of the amendment that added the new matter.

As such, it turns out that Sonos is not entitled to its claimed priority date of September 12, 2006, when the provisional application was filed; or a priority date of September 11, 2007, when the non-provisional application was filed; or a priority date based on any of the continuation applications in the daisy chain leading up to 2019, for that matter. The effective filing date of the patents in suit should be August 23, 2019.

That which infringes if later anticipates if before. It is undisputed that Google released products with the accused functionality in December 2015. Those accused products are now prior art. This order finds and concludes that the patents in suit are anticipated by Google’s products and are therefore **INVALID**.

6. WRITTEN DESCRIPTION REDUX.

To summarize, this order finds and concludes that the patents in suit are unenforceable on account of prosecution laches. It also finds and concludes that the patents are invalid as anticipated by the accused products themselves, because Sonos was not entitled to its claimed priority date on account of new matter added to the specification. One last step is required in the interests of justice. A pretrial order sustained the specification of the patents in suit against a written description challenge. With a more complete record, it is clear that was in error.

This order has explained that the earlier applications did not disclose the claimed invention. So, that means that the claimed invention must be disclosed by material that was

added by way of amendment on August 23, 2019. After all, “drafters of patent applications know that they must describe their inventions as well as disclose how to enable their use.” *AbbVie Deutschland GmbH & Co., KG v. Janssen Biotech, Inc.*, 759 F.3d 1285, 1298 (Fed. Cir. 2014). “The essence of the written description requirement is that a patent applicant, as part of the bargain with the public, must describe his or her invention so that the public will know what it is and that he or she has truly made the claimed invention.” *Ibid.* (citation omitted).

What was added on August 23, 2019? The application was amended to include: (1) Figures 7 and 8, (2) descriptions of Figures 7 and 8, and (3) the new-matter sentence describing Figure 5B.

Figures 7 and 8 were identical to images in Appendix A (and the original zone scenes UI document) and were not new matter. They showed a “Party Mode” zone scene and a “Morning Wakeup” zone scene displayed next to each other in one instance, and a “Party Mode” zone scene, a “Wakeup” zone scene, and a “Garden Party” zone scene displayed next to each other in another.



FIG. 7

Invoking a Scene I from Appendix A.

Figure 7 from Patents in Suit.



Invoking a Scene II from Appendix A.

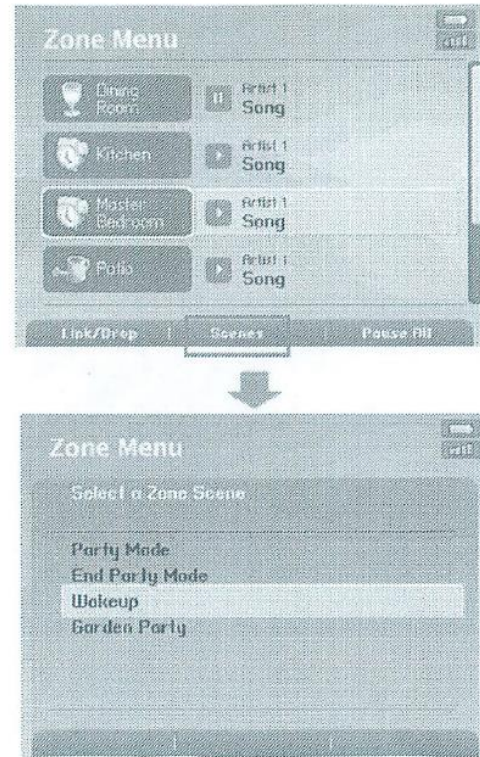


FIG. 8

Figure 8 from Patents in Suit.

(TX6545 5–6; ’885 and ’966 patents at FIG. 7, FIG. 8). Given, however, that Appendix A did not disclose overlapping zone scenes in light of the omission of sentences discussed previously, Figures 7 and 8 likewise did not disclose overlapping zone scenes. These zone scenes could have been distinct groups of zone players, like those available in the Sonos 2005 prior art system, but with the new feature to save and invoke on demand. This order finds that these figures were properly inserted by way of amendment under 37 C.F.R. Section 1.57(g), but that they had no effect in terms of disclosing the claimed invention. Meanwhile, the descriptions of Figures 7 and 8 likewise did not indicate that zone scenes could overlap; they merely referred to “selectable indications of zone scenes” and “available zone scenes” (’885 and ’966 patents 11:15, 19–20).

This leaves the single new-matter sentence describing Figure 5B. Put aside the new-matter point and ask: Did that sentence disclose the claimed invention?

To glean overlapping zone scenes from this sentence, one must do so by way of inference. Because Figure 5B shows a “user interface **520**” for forming a scene that “lists available zones in a system,” and because the “list of zones in the user interface **520** includes ALL the zones in the system, including the zones that are already grouped,” one can infer zone scenes overlap (*id.* at 10:12, 14–17). That’s it. That is the sole adumbration of overlapping zone scenes in the entire six-page specification, as amended (again, even forgiving the new-matter point).

The Federal Circuit has been clear that “novel aspects of the invention must be disclosed and not left to inference.” *See Crown Operations Int’l, Ltd. V. Solutia Inc.*, 289 F.3d 1367, 1380 (Fed. Cir. 2002) (citing *Genentech, Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1366 (Fed. Cir. 1997)). “Working backward from a knowledge of [the claims]” to “derive written description support from an amalgam of disclosures plucked selectively” does not cut it. *See Novozymes A/S v. DuPont Nutrition Biosciences APS*, 723 F.3d 1336, 1349 (Fed. Cir. 2013). A person of ordinary skill in the art “must immediately discern the limitation at issue in the claims,” *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1323 (Fed. Cir. 2000), “viewing the matter from the proper vantage point ‘of one with no foreknowledge of the specific [limitation.]’” *Novozymes*, 723 F.3d at 1349 (quoting *In re Ruschig*, 379 F.2d 990, 995 (C.C.P.A. 1967)).

Other patent appeals courts have recognized this as well. Indeed, the Patent Trial and Appeal Board recently observed “[i]t is well-settled that one cannot disclose a forest in the original application, and then later pick a tree out of the forest and say here is my invention.” *Ex parte Hassler et al.*, No. 2020-001367, 2020 WL 6781447, at *5 (P.T.A.B. Nov. 13, 2020) (quoting *Purdue Pharma*, 230 F.3d at 1326). In doing so, it extended an analogy made by the Court of Customs and Patent Appeals in reference to written description several decades ago:

It is no help in finding a trail or in finding one’s way through the woods where the trails have disappeared — or have not yet been made, which is more like the case here — to be confronted simply by a large number of unmarked trees. Appellants are pointing to trees. We are looking for blaze marks which single out particular trees. We see none.

1 *In re Ruschig*, 379 F.3d at 994–95. Likewise, we see none here. The trial evidence has made
2 clear that the sentence describing Figure 5B would not allow a person of skill in the art to
3 recognize that the inventor invented what is claimed — that is, overlapping zone scenes.

4 To help demonstrate, let’s revisit how the Sonos 2005 prior art system worked. Recall, in
5 2005, if three zone players were grouped, two of those zone players would have been
6 configured to play music in synchrony with one of those zone players. For example, if our
7 hypothetical user wanted to play music in her dining room, living room, and bedroom, she
8 would start with a “leader” zone player, say “Dining Room.” Then, she would link another
9 zone player, say “Living Room,” at which point “Living Room” would be instantly configured
10 to play music in synchrony with “Dining Room.” And, then, she would link yet another zone
11 player, say “Bedroom,” at which point “Bedroom” would be instantly configured to play music
12 in synchrony with “Dining Room” and, thereby, “Living Room.” In this configuration,
13 “Living Room” and “Bedroom” *were not connected to each other*. Rather, they were both
14 connected to and configured to play music in synchrony with the “leader” zone player, “Dining
15 Room.”

16 Now, let’s consider the zone scenes of the original UI documents, which the parties
17 stipulate disclosed the claimed invention. If our user had invoked a first zone scene composed
18 of the zone players in her dining room, living room, and bedroom, and she then invoked a
19 second zone scene composed of the zone players in her dining room and bathroom, what would
20 happen? (Note the overlap of the zone player in the dining room.) Would “Dining Room”
21 keep playing music in the first zone scene configuration? Would the system tell the user that
22 the second zone scene configuration was unavailable due to “Dining Room” already being in
23 use? Would “Dining Room” switch over to the second zone scene configuration? *If so, what if*
24 *“Dining Room” was the “leader” zone player?* How would the “Living Room” and
25 “Bedroom” zone players know to stay grouped in the first zone scene configuration? None of
26 these questions were addressed, much less solved, in the specification of the patents in suit.
27 Yet these questions bristle upon consideration.
28

At trial, by contrast, Google explained how it was able to implement the claimed invention in 2015. Specifically, according to Google Engineer Kenneth MacKay, each zone player in its system was assigned a dynamic leader rating, and the zone player with the highest rating would serve as the leader for the zone scene — the one that the other zone players synchronized to. When a “leader” zone player was invoked in a second zone scene, the first zone scene would persist with a new “leader” zone player based on which remaining zone player had the highest leader rating. As such, the original “leader” zone player could move to another zone scene. To repeat, nothing in the specification of the patents in suit explained such a solution (or even recognized this problem). Meanwhile, Google considered four options for facilitating overlapping group membership and settled on this one (TX6454).

Before trial, a prior order rejected Google’s arguments that claim 1 of the ’885 patent was invalid for lack of written description (Dkt. No. 309 at 14–17). These arguments were raised in an opposition brief, and Sonos filed a reply brief that pointed to the sentence describing Figure 5B. Relying on that sentence, the prior order found sufficient written description support for limitations involving overlap. To repeat, the judge was not made aware in the briefing (or at the hearing, or otherwise until trial,) that this sentence had been inserted by amendment in August 2019. That, alone, would have been a red flag. But the judge was also not made aware that none of the earlier applications in the zone scene family had claimed overlap until 2019. Nor was the judge made aware of how the Sonos 2005 prior art system and Google’s accused products grouped speakers by synchronizing to a “leader.” Nor was the judge made aware that overlap was the lynchpin of the claimed invention. When the judge observed this at trial, and, in light of this, asked about the written description support for overlap, Sonos emphasized that what was inventive was “separating the defining of the group from the implementation of the group,” *i.e.*, customizing, saving, and invoking (*see* Tr. 751:21–22). But the patent examiner clarified that this was not true.

Maybe this is beside the point now, given the rulings made earlier in this order. But Sonos has indicated that it may bring lawsuits against others in the industry based on these patents. It would be a miscarriage of justice for Sonos to assert that this district judge has

1 already found that written description was adequate when, with the benefit of the trial record, it
2 has since become evident that it was inadequate. Accordingly, the part of the prior order on
3 written description is **VACATED**. See Fed. R. Civ. P. 54(b).

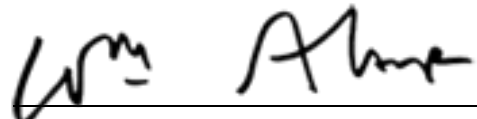
4 **CONCLUSION**

5 It is wrong that our patent system was used in this way. With its constitutional
6 underpinnings, this system is intended to promote and protect innovation. Here, by contrast, it
7 was used to punish an innovator and to enrich a pretender by delay and sleight of hand. It has
8 taken a full trial to learn this sad fact, but, at long last, a measure of justice is done.

9 In sum, under the doctrine of prosecution laches, the patents in suit are
10 **UNENFORCEABLE**. What's more, they are anticipated by the accused products themselves on
11 account of new matter having been inserted into the specification and are thus **INVALID**. And,
12 the portion of the prior order on written description (Dkt. No. 309 at 14–17) is **VACATED**. In
13 light of these holdings, all remaining affirmative defenses are **MOOT** and all post-trial motions
14 are **DENIED AS MOOT**. Final judgment will be entered.

15 **IT IS SO ORDERED.**

16
17 Dated: October 6, 2023.



18
19 WILLIAM ALSUP
UNITED STATES DISTRICT JUDGE

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

SONOS, INC.,

Plaintiff,

v.

GOOGLE LLC,

Defendant.

No. C 20-06754 WHA

No. C 21-07559 WHA

FINAL JUDGMENT

For the reasons stated in the accompanying order, final judgment is hereby entered in favor of Google LLC and against Sonos, Inc. in No. C 21-07559 WHA.

In No. C 20-06754 WHA, declaratory relief is hereby entered in favor of Google LLC and against Sonos, Inc. that: (1) United States Patent Nos. 10,848,885 and 10,469,966 are unenforceable due to prosecution laches, and (2) United States Patent Nos. 10,848,885 and 10,469,966 are invalid as anticipated by the accused products as measured by the adjusted priority date on account of new matter having been inserted into the specification.

The Clerk shall close the file.

IT IS SO ORDERED.

Dated: October 10, 2023.



WILLIAM ALSUP
UNITED STATES DISTRICT JUDGE

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

SONOS, INC.,

Plaintiff,

vs.

GOOGLE LLC,

Defendant.

Case No. 3:20-cv-06754-WHA
Consolidated with Case No. 3:21-cv-07559-
WHA

~~[PROPOSED]~~ AMENDED FINAL
JUDGMENT

1 Consistent with Google's unopposed motion to amend the judgment, previous rulings by the
2 court, and agreements by the parties, the Court amends and supplements its judgment in these
3 consolidated actions as follows:

4 1. Sonos's claims of infringement of U.S. Patent No. 9,344,206 were dismissed with
5 prejudice. *Sonos, Inc. v. Google LLC*, No. 3:21-cv-07559-WHA ("Transferred Action"), Dkt. 151;
6 *Sonos, Inc. v. Google LLC*, No. 3:20-cv-06754-WHA ("California Action"), Dkt. 132.

7 2. Sonos's claims of infringement of U.S. Patent No. 9,219,460 were dismissed without
8 prejudice. *See* Transferred Action, Dkts. 50, 51.

9 3. Judgment is entered for Google and against Sonos that claim 13 of U.S. Patent No.
10 9,967,615 is not infringed and is invalid. *See* California Action, Dkts. 316, 566.

11 4. Judgment is entered for Google and against Sonos that claims 1, 2, 4, 9, 11, 12, 13,
12 and 16 of U.S. Patent No. 10,779,033 are invalid. *See* California Action, Dkt. 566.

13 5. Google's claims for breach of contract and conversion and requests for related relief
14 are dismissed without prejudice. *See* California Action, Dkts. 552, 566 at 31.

15 6. Judgment is entered for Google and against Sonos that claims 1, 2, 4, 6, and 8 of U.S.
16 Patent No. 10,469,966 are invalid and the '966 patent is unenforceable. *See* California Action, Dkt.
17 868.

18 7. Judgment is entered for Google and against Sonos that claim 1 of U.S. Patent No.
19 10,848,885 is invalid and the '885 patent is unenforceable. *See* California Action, Dkt. 868.

20 Taxable costs will be addressed by separate order. Requests for attorneys' fees have been
21 postponed by stipulation. *See* California Action, Dkt. 874. All other claims and requests for relief
22 and any related defenses are denied as moot.

23 IT IS SO ORDERED.

24
25 DATED: November 14, 2023.



26 The Honorable William Alsup
27 United States District Court Judge
28



US00967615B2

(12) **United States Patent**
Coburn, IV et al.

(10) **Patent No.:** **US 9,967,615 B2**

(45) **Date of Patent:** ***May 8, 2018**

(54) **NETWORKED MUSIC PLAYBACK**

(56) **References Cited**

(71) Applicant: **Sonos, Inc.**, Santa Barbara, CA (US)

U.S. PATENT DOCUMENTS

(72) Inventors: **Arthur Coburn, IV**, Cambridge, MA (US); **Joni Hoadley**, Santa Barbara, CA (US)

5,406,634 A 4/1995 Anderson et al.
5,440,644 A 8/1995 Farinelli et al.
(Continued)

(73) Assignee: **Sonos, Inc.**, Santa Barbara, CA (US)

FOREIGN PATENT DOCUMENTS

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

CA 2832542 A1 10/2012
CN 101212823 A 7/2008
(Continued)

This patent is subject to a terminal disclaimer.

OTHER PUBLICATIONS

(21) Appl. No.: **14/628,952**

International Bureau, "International Preliminary Report on Patentability", issued in connection with PCT application No. PCT/US2012/071212, dated Jul. 10, 2014, pp. 8.

(22) Filed: **Feb. 23, 2015**

(Continued)

(65) **Prior Publication Data**

US 2015/0172756 A1 Jun. 18, 2015

Primary Examiner — Oschat Montoya

(74) *Attorney, Agent, or Firm* — McDonnell Boehnen Hulbert & Berghoff LLP

(57)

ABSTRACT

Systems, methods, apparatus, and articles of manufacture to facilitate connection to a multimedia playback network are disclosed. An example method includes detecting a first input including an identification of a playback device; detecting a second input including an identification of an item on a controller, wherein multimedia content associated with the item is retrievable from a content provider; detecting a trigger, wherein the trigger is not the first input or the second input; and sending, in response to detecting the trigger, information regarding the multimedia content from the controller to the playback device, wherein the information includes an identification of the multimedia content for playback by the playback device, and wherein the information causes (a) the playback device to retrieve, independent of the controller, the multimedia content from the content provider and (b) playback of the retrieved multimedia content.

Related U.S. Application Data

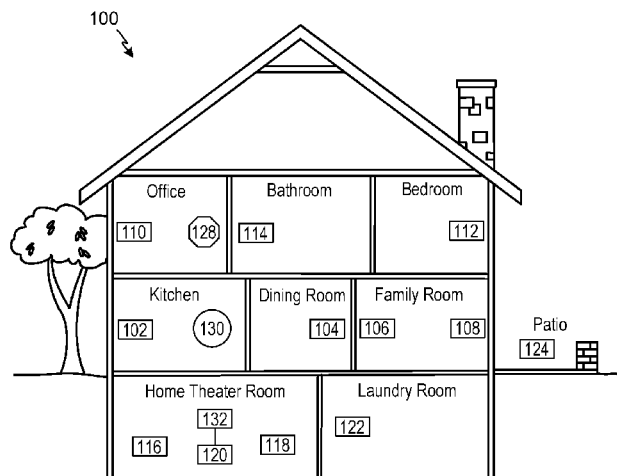
(63) Continuation of application No. 13/341,237, filed on Dec. 30, 2011, now Pat. No. 9,654,821.

(51) **Int. Cl.**
H04N 7/18 (2006.01)
H04N 21/436 (2011.01)
(Continued)

(52) **U.S. Cl.**
CPC ... **H04N 21/43615** (2013.01); **H04L 65/4084** (2013.01); **H04N 21/4307** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04N 21/43615; H04N 21/6581; H04N 21/439; H04N 21/6125; H04N 21/64322;
(Continued)

29 Claims, 11 Drawing Sheets



US 9,967,615 B2

Page 2

- (51) **Int. Cl.**
- | | | | | |
|---------------------|-----------|-------------------|---------|---------------------------------------|
| <i>H04N 21/658</i> | (2011.01) | 7,725,551 B2 | 5/2010 | Szeto et al. |
| <i>H04L 29/06</i> | (2006.01) | 7,742,740 B2 | 6/2010 | Goldberg et al. |
| <i>H04N 21/439</i> | (2011.01) | 7,797,446 B2 | 9/2010 | Heller et al. |
| <i>H04N 21/61</i> | (2011.01) | 7,805,682 B1 | 9/2010 | Lambourne |
| <i>H04N 21/643</i> | (2011.01) | 7,827,259 B2 | 11/2010 | Heller et al. |
| <i>H04N 21/6587</i> | (2011.01) | 7,853,341 B2 | 12/2010 | McCarty et al. |
| <i>H04N 21/472</i> | (2011.01) | 7,958,441 B2 | 6/2011 | Heller et al. |
| <i>H04N 21/485</i> | (2011.01) | 7,987,294 B2 | 7/2011 | Bryce et al. |
| <i>H04N 21/81</i> | (2011.01) | 8,014,423 B2 | 9/2011 | Thaler et al. |
| <i>H04N 21/43</i> | (2011.01) | 8,045,952 B2 | 10/2011 | Qureshey et al. |
| <i>H04N 21/433</i> | (2011.01) | 8,050,652 B2 | 11/2011 | Qureshey et al. |
| <i>H04N 21/858</i> | (2011.01) | 8,055,364 B2 | 11/2011 | Champion |
| | | 8,060,407 B1 | 11/2011 | Delker et al. |
| | | 8,072,905 B2 | 12/2011 | Haff et al. |
| | | 8,074,253 B1 | 12/2011 | Nathan |
| | | 8,099,313 B2 | 1/2012 | Messer et al. |
| | | 8,103,009 B2 | 1/2012 | McCarty et al. |
| | | 8,111,132 B2 | 2/2012 | Allen et al. |
| | | 8,131,390 B2 | 3/2012 | Braithwaite et al. |
| | | 8,140,974 B2 | 3/2012 | Hayter et al. |
| | | 8,148,622 B2 | 4/2012 | Rothkopf et al. |
| | | 8,156,435 B2 | 4/2012 | Wohlert |
| | | 8,204,890 B1 | 6/2012 | Gogan |
| | | 8,214,740 B2 | 7/2012 | Johnson |
| | | 8,234,395 B2 | 7/2012 | Millington |
| | | 8,290,603 B1 | 10/2012 | Lambourne |
| | | 8,316,154 B2 | 11/2012 | Yoneda |
| | | 8,364,296 B2 * | 1/2013 | Wilhelm G11B 27/10
455/502 |
| | | 8,407,623 B2 | 3/2013 | Kerr et al. |
| | | 8,483,853 B1 | 7/2013 | Lambourne |
| | | 8,544,046 B2 | 9/2013 | Gran et al. |
| | | 8,588,949 B2 | 11/2013 | Lambourne et al. |
| | | 8,799,395 B2 | 8/2014 | Seidel et al. |
| | | 8,818,538 B2 | 8/2014 | Sakata |
| | | 8,843,586 B2 | 9/2014 | Pantos et al. |
| | | 8,880,648 B1 | 11/2014 | Arora et al. |
| | | 8,942,252 B2 | 1/2015 | Balassanian et al. |
| | | 8,954,177 B2 | 2/2015 | Sanders |
| | | 8,966,394 B2 | 2/2015 | Gates et al. |
| | | 9,137,602 B2 | 9/2015 | Mayman et al. |
| | | 9,338,206 B2 | 5/2016 | Keum et al. |
| | | 9,507,780 B2 | 11/2016 | Rothkopf et al. |
| | | 9,609,448 B2 | 3/2017 | Bentley et al. |
| | | 9,635,068 B2 | 4/2017 | Garmark et al. |
| | | 2001/0042107 A1 | 11/2001 | Palin |
| | | 2002/0002039 A1 | 1/2002 | Qureshey et al. |
| | | 2002/0022453 A1 | 2/2002 | Balog et al. |
| | | 2002/0026442 A1 | 2/2002 | Lipscomb et al. |
| | | 2002/0124097 A1 | 9/2002 | Isely et al. |
| | | 2002/0165921 A1 | 11/2002 | Sapieyevski |
| | | 2002/0178191 A1 | 11/2002 | Sielken |
| | | 2002/0194309 A1 | 12/2002 | Carter et al. |
| | | 2003/0023741 A1 | 1/2003 | Tomassetti et al. |
| | | 2003/0079038 A1 | 4/2003 | Robbin et al. |
| | | 2003/0157951 A1 | 8/2003 | Hasty |
| | | 2003/0198257 A1 * | 10/2003 | Sullivan et al. 370/516 |
| | | 2003/0210796 A1 | 11/2003 | McCarty et al. |
| | | 2004/0024478 A1 | 2/2004 | Hans et al. |
| | | 2004/0025185 A1 | 2/2004 | Goci et al. |
| | | 2004/0078383 A1 | 4/2004 | Mercer et al. |
| | | 2004/0078812 A1 | 4/2004 | Calvert |
| | | 2004/0215611 A1 | 10/2004 | Jawa et al. |
| | | 2004/0261040 A1 | 12/2004 | Radcliffe et al. |
| | | 2005/0028225 A1 | 2/2005 | Dawson et al. |
| | | 2005/0108320 A1 | 5/2005 | Lord et al. |
| | | 2005/0138193 A1 | 6/2005 | Encarnacion et al. |
| | | 2005/0155072 A1 | 7/2005 | Kaczowka et al. |
| | | 2005/0166157 A1 | 7/2005 | Ollis et al. |
| | | 2005/0235334 A1 * | 10/2005 | Togashi H04L 12/2807
725/117 |
| | | 2005/0240494 A1 | 10/2005 | Cue et al. |
| | | 2005/0262253 A1 | 11/2005 | Li et al. |
| | | 2006/0002681 A1 | 1/2006 | Spilo et al. |
| | | 2006/0041639 A1 | 2/2006 | Lamkin et al. |
| | | 2006/0062094 A1 | 3/2006 | Nathan et al. |
| | | 2006/0107237 A1 | 5/2006 | Kim |
| | | 2006/0156236 A1 | 7/2006 | Heller et al. |
| | | 2006/0168340 A1 | 7/2006 | Heller et al. |
- (52) **U.S. Cl.**
- CPC *H04N 21/439* (2013.01); *H04N 21/4333* (2013.01); *H04N 21/47202* (2013.01); *H04N 21/4852* (2013.01); *H04N 21/6125* (2013.01); *H04N 21/64322* (2013.01); *H04N 21/6581* (2013.01); *H04N 21/6587* (2013.01); *H04N 21/8113* (2013.01); *H04N 21/8586* (2013.01)
- (58) **Field of Classification Search**
- CPC *H04N 21/6587*; *H04N 21/47202*; *H04N 21/4852*; *H04N 21/8113*; *H04N 21/4307*; *H04N 21/4333*; *H04N 21/8586*; *H04L 65/4084*
- See application file for complete search history.
- (56) **References Cited**
- U.S. PATENT DOCUMENTS
- | | | |
|--------------|---------|--------------------|
| 5,761,320 A | 6/1998 | Farinelli et al. |
| 5,856,827 A | 1/1999 | Sudo |
| 5,923,902 A | 7/1999 | Inagaki |
| 6,002,862 A | 12/1999 | Takaike |
| 6,032,202 A | 2/2000 | Lea et al. |
| 6,181,316 B1 | 1/2001 | Little et al. |
| 6,255,961 B1 | 7/2001 | Van et al. |
| 6,256,554 B1 | 7/2001 | Dilorenzo |
| 6,404,811 B1 | 6/2002 | Cvetko et al. |
| 6,469,633 B1 | 10/2002 | Wachter |
| 6,522,886 B1 | 2/2003 | Youngs et al. |
| 6,587,127 B1 | 7/2003 | Leeke et al. |
| 6,611,537 B1 | 8/2003 | Edens et al. |
| 6,631,410 B1 | 10/2003 | Kowalski et al. |
| 6,728,531 B1 | 4/2004 | Lee et al. |
| 6,732,155 B2 | 5/2004 | Meek |
| 6,757,517 B2 | 6/2004 | Chang |
| 6,778,869 B2 | 8/2004 | Champion |
| 6,826,283 B1 | 11/2004 | Wheeler et al. |
| 6,985,694 B1 | 1/2006 | De et al. |
| 7,017,118 B1 | 3/2006 | Carroll |
| 7,020,048 B2 | 3/2006 | McComas |
| 7,113,833 B1 | 9/2006 | Brown et al. |
| 7,117,451 B2 | 10/2006 | Sielken |
| 7,130,608 B2 | 10/2006 | Hollstrom et al. |
| 7,130,616 B2 | 10/2006 | Janik |
| 7,143,939 B2 | 12/2006 | Henzerling |
| 7,178,106 B2 | 2/2007 | Lamkin et al. |
| 7,187,947 B1 | 3/2007 | White et al. |
| 7,236,773 B2 | 6/2007 | Thomas |
| 7,295,548 B2 | 11/2007 | Blank et al. |
| 7,312,785 B2 | 12/2007 | Tsuk et al. |
| 7,358,960 B2 | 4/2008 | Mak |
| 7,391,791 B2 | 6/2008 | Balassanian et al. |
| 7,483,538 B2 | 1/2009 | McCarty et al. |
| 7,509,181 B2 | 3/2009 | Champion |
| 7,571,014 B1 | 8/2009 | Lambourne et al. |
| 7,630,501 B2 | 12/2009 | Blank et al. |
| 7,643,894 B2 | 1/2010 | Braithwaite et al. |
| 7,657,910 B1 | 2/2010 | McAulay et al. |
| 7,689,304 B2 | 3/2010 | Sasaki |
| 7,725,533 B2 | 5/2010 | Szeto et al. |

US 9,967,615 B2

Page 3

(56)

References Cited

U.S. PATENT DOCUMENTS

2006/0195480 A1 8/2006 Spiegelman et al.
 2006/0195521 A1 8/2006 New et al.
 2006/0195864 A1 8/2006 New et al.
 2006/0218294 A1 9/2006 Rosenberg
 2006/0253782 A1 11/2006 Stark et al.
 2006/0258289 A1* 11/2006 Dua G06F 17/30058
 455/41.3
 2006/0263048 A1 11/2006 Sato et al.
 2007/0038999 A1 2/2007 Millington et al.
 2007/0061725 A1 3/2007 Isaac et al.
 2007/0067808 A1 3/2007 Dacosta
 2007/0083897 A1 4/2007 Brownell
 2007/0106672 A1 5/2007 Sighart et al.
 2007/0142944 A1 6/2007 Goldberg et al.
 2007/0169087 A1 7/2007 Fadell
 2007/0266065 A1 11/2007 Rosenberg
 2007/0288470 A1 12/2007 Kauniskangas et al.
 2008/0005690 A1 1/2008 Van
 2008/0016465 A1 1/2008 Foxenland
 2008/0018625 A1 1/2008 Ijichi et al.
 2008/0025535 A1 1/2008 Rajapakse
 2008/0059567 A1 3/2008 Williams et al.
 2008/0086379 A1 4/2008 Dion et al.
 2008/0133715 A1 6/2008 Yoneda et al.
 2008/0134256 A1* 6/2008 DaCosta H04N 7/17318
 725/62
 2008/0177822 A1 7/2008 Yoneda
 2008/0209487 A1 8/2008 Osann et al.
 2008/0242222 A1 10/2008 Bryce et al.
 2008/0292120 A1 11/2008 Wilson
 2009/0006542 A1 1/2009 Feldman et al.
 2009/0059512 A1 3/2009 Lydon et al.
 2009/0097818 A1 4/2009 Hirata
 2009/0132712 A1 5/2009 P et al.
 2009/0171487 A1 7/2009 Wilhelm
 2009/0172542 A1 7/2009 Girish et al.
 2009/0197524 A1 8/2009 Haff et al.
 2009/0222392 A1 9/2009 Martin et al.
 2009/0228919 A1* 9/2009 Zott H04N 7/17318
 725/34
 2009/0248702 A1 10/2009 Schwartz et al.
 2009/0249222 A1 10/2009 Schmidt et al.
 2009/0259765 A1 10/2009 Karlsson et al.
 2009/0275285 A1 11/2009 Maricevic et al.
 2010/0005496 A1* 1/2010 Ellis et al. 725/87
 2010/0009674 A1 1/2010 Sapkota et al.
 2010/0031366 A1 2/2010 Knight et al.
 2010/0042235 A1 2/2010 Basso et al.
 2010/0082725 A1 4/2010 Onishi
 2010/0082731 A1 4/2010 Haughay et al.
 2010/0087214 A1 4/2010 Bournel et al.
 2010/0094833 A1 4/2010 Svendsen
 2010/0095332 A1 4/2010 Gran et al.
 2010/0206815 A1 8/2010 Garusi et al.
 2010/0211438 A1 8/2010 Lutnick et al.
 2010/0250669 A1 9/2010 Pan
 2010/0299402 A1 11/2010 Korman et al.
 2010/0299639 A1 11/2010 Ramsay et al.
 2010/0303244 A1 12/2010 Kim et al.
 2010/0306815 A1* 12/2010 Emerson G11B 27/034
 725/134
 2011/0004330 A1 1/2011 Rothkopf et al.
 2011/0047574 A1 2/2011 Tecot et al.
 2011/0054641 A1 3/2011 Hur
 2011/0055901 A1 3/2011 Karaoguz et al.
 2011/0060998 A1 3/2011 Schwartz et al.
 2011/0066943 A1 3/2011 Brillon et al.
 2011/0131272 A1 6/2011 Littlejohn et al.
 2011/0131518 A1 6/2011 Ohashi
 2011/0131520 A1 6/2011 Al-Shaykh et al.
 2011/0179455 A1 7/2011 Thompson
 2011/0218656 A1 9/2011 Bishop et al.
 2011/0225496 A1 9/2011 Jeffe et al.
 2011/0252118 A1 10/2011 Pantos et al.
 2011/0265003 A1 10/2011 Schubert et al.

2011/0295974 A1 12/2011 Kashef et al.
 2012/0029672 A1 2/2012 Hamilton et al.
 2012/0038541 A1 2/2012 Song et al.
 2012/0040720 A1 2/2012 Zhang et al.
 2012/0050012 A1 3/2012 Alsina et al.
 2012/0054808 A1 3/2012 Nijim
 2012/0057853 A1 3/2012 Huber et al.
 2012/0089910 A1 4/2012 Cassidy
 2012/0113964 A1 5/2012 Petersen et al.
 2012/0117026 A1 5/2012 Cassidy
 2012/0117193 A1 5/2012 Phillips et al.
 2012/0117586 A1* 5/2012 McCoy et al. 725/25
 2012/0147825 A1 6/2012 Hassan et al.
 2012/0159372 A1 6/2012 Stallings et al.
 2012/0174204 A1 7/2012 Sturm et al.
 2012/0185770 A1 7/2012 Hwang et al.
 2012/0192071 A1* 7/2012 Millington H04J 3/0664
 715/716
 2012/0202485 A1 8/2012 Mirbaha et al.
 2012/0227076 A1 9/2012 McCoy et al.
 2012/0233067 A1 9/2012 Matthew et al.
 2012/0272062 A1 10/2012 Lee et al.
 2012/0284423 A1 11/2012 Weel
 2012/0304233 A1* 11/2012 Roberts H04N 21/23113
 725/82
 2012/0311094 A1 12/2012 Biderman et al.
 2012/0311618 A1 12/2012 Blaxland
 2013/0014015 A1 1/2013 Lambourne et al.
 2013/0024018 A1 1/2013 Chang et al.
 2013/0028263 A1 1/2013 Rajapakse
 2013/0047084 A1 2/2013 Sanders et al.
 2013/0054742 A1 2/2013 Tsuji et al.
 2013/0073584 A1 3/2013 Kuper et al.
 2013/0086003 A1 4/2013 Alsina et al.
 2013/0111529 A1 5/2013 Yao et al.
 2013/0117299 A1 5/2013 Kraatz
 2013/0151728 A1 6/2013 Currier
 2013/0157566 A1 6/2013 Oguchi
 2013/0165164 A1 6/2013 Rowe
 2013/0167029 A1 6/2013 Friesen et al.
 2013/0173034 A1 7/2013 Reimann et al.
 2013/0246916 A1 9/2013 Reimann et al.
 2013/0254207 A1 9/2013 Coburn, IV et al.
 2013/0300546 A1 11/2013 Kim et al.
 2013/0326041 A1 12/2013 Bellet et al.
 2013/0346559 A1 12/2013 Van et al.
 2013/0346859 A1 12/2013 Bates et al.
 2013/0347117 A1 12/2013 Parks et al.
 2014/0006483 A1 1/2014 Garmark et al.
 2014/0006947 A1 1/2014 Garmark et al.
 2014/0052770 A1 2/2014 Gran et al.
 2014/0075308 A1 3/2014 Sanders et al.
 2014/0075314 A1 3/2014 Bachman et al.
 2014/0080479 A1 3/2014 Vangala et al.
 2014/0096166 A1 4/2014 Gordon et al.
 2014/0108929 A1 4/2014 Garmark et al.
 2014/0115462 A1 4/2014 Reznor et al.
 2014/0122737 A1 5/2014 Silberstein et al.
 2014/0123005 A1 5/2014 Forstall et al.
 2014/0140530 A1 5/2014 Gomes-Casseres et al.
 2014/0169569 A1 6/2014 Toivanen et al.
 2014/0195587 A1 7/2014 Sukoff et al.
 2014/0195925 A1 7/2014 Wikander
 2014/0215009 A1 7/2014 Zhang
 2014/0229959 A1 8/2014 Beckhardt et al.
 2014/0378056 A1 12/2014 Liu
 2015/0026613 A1 1/2015 Kwon et al.
 2015/0074527 A1 3/2015 Sevigny et al.
 2015/0074528 A1 3/2015 Sakalowsky et al.
 2015/0256954 A1 9/2015 Carlsson et al.
 2015/0286360 A1 10/2015 Wachter
 2015/0304476 A1 10/2015 Katada

FOREIGN PATENT DOCUMENTS

CN 101212823 A 7/2008
 EP 1389853 A1 2/2004
 JP 2007060123 A 3/2007
 JP 2007512718 A 5/2007

US 9,967,615 B2

Page 4

(56)

References Cited

FOREIGN PATENT DOCUMENTS

JP	2007199220	A	8/2007
JP	2008027537	A	2/2008
JP	2009044410		2/2009
JP	2010067097	A	3/2010
JP	2010510696		4/2010
JP	2012248199	A	12/2012
JP	2013101631	A	5/2013
KR	20090017795		2/2009
WO	0153994		7/2001
WO	2003093950	A2	11/2003
WO	2005013047	A2	2/2005
WO	2008047184	A1	4/2008
WO	2009086599	A1	7/2009
WO	2011049497	A1	4/2011
WO	2013049346	A1	4/2013
WO	2013055661	A1	4/2013
WO	2013101727		7/2013
WO	2014149533	A2	9/2014
WO	2014172462	A1	10/2014

OTHER PUBLICATIONS

"Welcome. You're watching Apple TV." Apple TV 1st Generation Setup Guide, Apr. 8, 2008 <http://manuals.info.apple.com/MANUALS/0/MA403/en_US/AppleTV_SetupGuide.pdf> Retrieved Oct. 14, 2014, 40 pages.

"Welcome. You're watching Apple TV." Apple TV 2nd Generation Setup Guide, Mar. 10, 2011 <http://manuals.info.apple.com/MANUALS/1000/MA1555/en_US/Apple_TV_2nd_gen_Setup_Guide.pdf> Retrieved Oct. 16, 2014, 36 pages.

The United States Patent and Trademark Office, "Non-Final Office Action", issued in connection with U.S. Appl. No. 14/520,566, dated Dec. 30, 2014, 10 pages.

Sonos, Inc., "Sonos Multi-Room Music System User Guide," Version 090401, Apr. 1, 2009, 256 pages.

Sonos, Inc., "Sonos Wireless Dock Product Guide," Version 100101, Oct. 10, 2001, 196 pages.

Australian Intellectual Property Office, "Patent Examination Report No. 1", issued in connection with Australian patent application No. 2012362573, dated Jan. 16, 2015, 3 pages.

The United States Patent and Trademark Office, "Non-Final Office action", issued in connection with U.S. Appl. No. 13/341,237, dated Jan. 25, 2013, 9 pages.

The United States Patent and Trademark Office, "Final Office action", issued in connection with U.S. Appl. No. 13/341,237, dated Aug. 6, 2013, 14 pages.

The United States Patent and Trademark Office, "Advisory action", issued in connection with U.S. Appl. No. 13/341,237, dated Oct. 16, 2013, 3 pages.

The United States Patent and Trademark Office, "Non-Final Office action", issued in connection with U.S. Appl. No. 13/341,237, dated Nov. 26, 2013, 15 pages.

The United States Patent and Trademark Office, "Final Office action", issued in connection with U.S. Appl. No. 13/341,237, dated Apr. 14, 2014, 12 pages.

The United States Patent and Trademark Office, "Non-Final Office action", issued in connection with U.S. Appl. No. 13/341,237, dated Oct. 8, 2014, 18 pages.

Advisory Action dated Dec. 16, 2015, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 11 pages.

Advisory Action dated Dec. 2, 2015, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 4 pages.

Canadian Office Action dated Nov. 12, 2015, issued in connection with Canadian Application No. 2,861,790, 3 pages.

Final Office Action dated Dec. 7, 2015, issued in connection with U.S. Appl. No. 13/864,075, filed Apr. 16, 2013, 16 pages.

Non-Final Office Action dated Nov. 18, 2015, issued in connection with U.S. Appl. No. 13/904,896, filed May 29, 2013, 18 pages.

Non-Final Office Action dated Nov. 18, 2015, issued in connection with U.S. Appl. No. 13/904,932, filed May 29, 2013, 12 pages.

Non-Final Office Action dated Dec. 28, 2015, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 10 pages.

Pre-Interview First Office Action dated Dec. 22, 2015, issued in connection with U.S. Appl. No. 14/520,578, filed Oct. 22, 2014, 9 pages.

Voyetra Turtle Beach, Inc., "AudioTron Quick Start Guide, Version 1.0", Mar. 2001, 24 pages.

Voyetra Turtle Beach, Inc., "AudioTron Reference Manual, Version 3.0", May 2002, 70 pages.

Voyetra Turtle Beach, Inc., "AudioTron Setup Guide, Version 3.0", May 2002, 38 pages.

Bluetooth, "Specification of the Bluetooth System: The ad hoc SCATTERNET for affordable and highly functional wireless connectivity" Core, Version 1.0 A, Jul. 26, 1999, 1068 pages.

Bluetooth, "Specification of the Bluetooth System: Wireless connections made easy" Core, Version 1.0 B, Dec. 1, 1999, 1081 pages.

Dell, Inc., "Dell Digital Audio Receiver: Reference Guide" Jun. 2000, 70 pages.

Dell, Inc., "Start Here" Jun. 2000, 2 pages.

United States Patent and Trademark Office, "Final Office Action", issued in connection with U.S. Appl. No. 13/341,237, dated Apr. 22, 2015, 11 pages.

International Searching Authority, "International Search Report", issued in connection with PCT Application No. PCT/US2014/039669, dated Sep. 22, 2014, 3 pages.

International Searching Authority, "International Search Report", issued in connection with PCT Application No. PCT/US2014/034290, dated Aug. 21, 2014, 3 pages.

International Searching Authority, "International Search Report", issued in connection with PCT Application No. PCT/US2014/034292, dated Aug. 14, 2014, 3 pages.

International Searching Authority, "International Search Report", issued in connection with PCT Application No. PCT/US2014/034372, dated Aug. 20, 2014, 3 pages.

Jo J., et al., "Synchronized One-to-many Media Streaming with Adaptive Playout Control," Proceedings of SPIE, 2002, vol. 4861, pp. 71-82.

Jones, Stephen. "Dell Digital Audio Receiver: Digital upgrade for your analog stereo" Analog Stereo. Jun. 24, 2000 <<http://www.reviewsonline.com/articles/961906864.htm>> retrieved Jun. 18, 2014, 2 pages.

Louderback, Jim. "Affordable Audio Receiver Furnishes Homes With MP3" TechTV Vault. Jun. 28, 2000 <<http://www.g4tv.com/articles/17923/affordable-audio-receiver-furnishes-homes-with-mp3/>> retrieved Jul. 10, 2014, 2 pages.

Motorola, "Simplefi, Wireless Digital Audio Receiver, Installation and User Guide", Dec. 31, 2001, 111 pages.

United States Patent and Trademark Office, "Non-Final Office Action", issued in connection with U.S. Appl. No. 13/864,081, dated Mar. 10, 2015, 13 pages.

United States Patent and Trademark Office, "Non-Final Office Action", issued in connection with U.S. Appl. No. 13/904,949, dated Mar. 13, 2015, 20 pages.

United States Patent and Trademark Office, "Non-Final Office Action", issued in connection with U.S. Appl. No. 13/904,896, dated Mar. 2, 2015, 15 pages.

United States Patent and Trademark Office, "Non-Final Office Action", issued in connection with U.S. Appl. No. 13/904,944, dated Apr. 23, 2015, 12 pages.

Sonos, "SonosTM Digital Music System User Guide", Version: 070101, Sonos, Inc., Jan. 2007, 179 pages.

Palm, Inc. "Handbook for the Palm VII Handheld" May 2000, 311 pages.

Higgins et al., "Presentations at WinHEC 2000" May 2000, 138 pages.

PRISMIQ: Inc., "PRISMIQ Media Player User Guide", 2003, 44 pages.

UPnP, "Universal Plug and Play Device Architecture"; Jun. 8, 2000; version 1.0; Microsoft Corporation, 54 pages.

Apple, Inc., "Welcome. You're watching Apple TV." Apple TV 3rd Generation Setup Guide, Mar. 16, 2012 <<http://manuals.info.apple>

US 9,967,615 B2

Page 5

(56)

References Cited

OTHER PUBLICATIONS

com/MANUALS/1000/MA1607/en_US/apple_tv_3rd_gen_setup.pdf> Retrieved Oct. 16, 2014, 36 pages.

International Searching Authority, "Written Opinion", issued in connection with PCT Application No. PCT/US2014/039669, dated Sep. 22, 2014, 5 pages.

International Searching Authority, "Written Opinion", issued in connection with PCT Application No. PCT/US2014/034290, dated Aug. 21, 2014, 5 pages.

International Searching Authority, "Written Opinion", issued in connection with PCT Application No. PCT/US2014/034292, dated Aug. 14, 2014, 4 pages.

International Searching Authority, "Written Opinion", issued in connection with PCT Application No. PCT/US2014/034290, dated Aug. 20, 2014, 6 pages.

European Patent Office, "The Extended European Search Report", issued in connection with European patent application No. 12861517.6, dated Jun. 9, 2015, 11 pages.

"Final Office Action dated Aug. 25, 2015, issued in connection with U.S. Appl. No. 13/864,081, filed Apr. 16, 2013, 15 pages."

"Non-Final Office Action dated Aug. 19, 2015, issued in connection with U.S. Appl. No. 13/864,075, filed Apr. 16, 2013, 18 pages."

Final Office Action dated Aug. 28, 2015, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 10 pages.

Non-Final Office Action dated Feb. 13, 2015, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 10 pages.

Non-Final Office Action dated Mar. 24, 2015, issued in connection with U.S. Appl. No. 13/864,086, filed Apr. 16, 2013, 14 pages.

"Advisory Action dated Sep. 17, 2015, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 4 pages."

"Final Office Action dated Sep. 25, 2015, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 14 pages."

"Advisory Action dated Oct. 29, 2015, issued in connection with U.S. Appl. No. 13/864,081, filed Apr. 16, 2013, 3 pages."

"Final Office Action dated Oct. 23, 2015, issued in connection with U.S. Appl. No. 13/904,944, filed May 29, 2013, 13 pages."

International Bureau, International Preliminary Report on Patentability, dated Oct. 29, 2015, issued in connection with International Application No. PCT/US2014/034290, filed on Apr. 16, 2014, 7 pages.

International Bureau, International Preliminary Report on Patentability, dated Oct. 29, 2015, issued in connection with International Application No. PCT/US2014/034292, filed on Apr. 16, 2014, 6 pages.

International Bureau, International Preliminary Report on Patentability, dated Oct. 29, 2015, issued in connection with International Application No. PCT/US2014/034372, filed on Apr. 16, 2014, 8 pages.

Notice of Allowance dated Oct. 9, 2015, issued in connection with U.S. Appl. No. 13/864,086, filed Apr. 16, 2013, 14 pages.

Supplemental Notice of Allowability dated Nov. 4, 2015, issued in connection with U.S. Appl. No. 13/864,086, filed Apr. 16, 2013, 2 pages.

Japanese Office Action dated Oct. 20, 2015, issued in connection with Japanese Application No. 2014-550400, 8 pages.

Final Office Action dated Jul. 8, 2015, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 8 pages.

Final Office Action dated Jun. 23, 2015, issued in connection with U.S. Appl. No. 13/904,896, filed May 29, 2013, 16 pages.

Advisory Action dated Jun. 16, 2016, issued in connection with U.S. Appl. No. 13/904,896, filed May 29, 2013, 5 pages.

Advisory Action dated Apr. 29, 2016, issued in connection with U.S. Appl. No. 13/864,075, filed Apr. 16, 2013, 3 pages.

Anonymous, "Sonos Controller for Mac or PC Product Guide", Retrieved from the Internet, XP055254086, 2013, 108 pages.

European Patent Office, Exam Report dated Apr. 28, 2016, issued in connection with European Patent Application No. 12861517.6, 6 pages.

European Patent Office, Extended European Search Report dated Jun. 7, 2016, issued in connection with European patent application No. 14803651.0, 10 pages.

Final Office Action dated Jun. 2, 2016, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 12 pages.

Final Office Action dated May 19, 2016, issued in connection with U.S. Appl. No. 14/520,578, filed Oct. 22, 2014, 12 pages.

First Action Interview Office Action dated Jun. 20, 2016, issued in connection with U.S. Appl. No. 14/520,578, filed Oct. 22, 2014, 5 pages.

Non-Final Office Action dated Jun. 16, 2016, issued in connection with U.S. Appl. No. 13/904,932, filed May 29, 2013, 15 pages.

Notice of Allowance dated Jun. 6, 2016, issued in connection with U.S. Appl. No. 13/904,944, filed May 29, 2013, 5 pages.

Notice of Allowance dated Jun. 13, 2016, issued in connection with U.S. Appl. No. 13/864,075, filed Apr. 16, 2013, 11 pages.

Non-Final Office Action dated Feb. 2, 2016, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 14 pages.

Non-Final Office Action dated Jan. 19, 2016, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 10 pages.

Advisory Action dated Feb. 25, 2016, issued in connection with U.S. Appl. No. 13/904944, filed May 29, 2013, 4 pages.

"Final Office Action dated Mar. 10, 2016, issued in connection with U.S. Appl. No. 13/904,932, filed May 29, 2013, 16 pages".

Notice of Allowance dated Feb. 26, 2016, issued in connection with U.S. Appl. No. 13/864,081, filed Apr. 16, 2013, 13 pages.

Final Office Action dated Mar. 21, 2016, issued in connection with U.S. Appl. No. 13/904,896, filed May 29, 2013, 19 pages.

Non-Final Office Action dated Mar. 17, 2016, issued in connection with U.S. Appl. No. 13/904,923, filed May 29, 2013, 15 pages.

Non-Final Office Action dated Mar. 25, 2016, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 13 pages.

Chen et al., "What a Juke! A Collaborative Music Sharing System," World of Wireless, Mobile and Multimedia Networks (WOWMOM), 2012 IEEE International Symposium, 2012, 6 pages.

Corrected Notice of Allowance dated Oct. 6, 2016, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 9 pages.

European Patent Office, Extended European Search Report dated Sep. 9, 2016, issued in connection with European patent application No. 14785247.9, 10 pages.

European Patent Office, Extended European Search Report dated Oct. 18, 2016, issued in connection with European patent application No. 14785806.2, 9 pages.

Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 13/904,923, filed May 29, 2013, 19 pages.

Notice of Allowance dated Nov. 7, 2016, issued in connection with U.S. Appl. No. 14/520,578, filed Oct. 22, 2014, 14 pages.

Notice of Allowance dated Sep. 20, 2016, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 12 pages.

European Patent Office, Extended European Search Report dated Aug. 1, 2016, issued in connection with European patent application No. 16160758.5, 11 pages.

Final Office Action dated Aug. 24, 2016, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 12 pages.

Final Office Action dated Aug. 29, 2016, issued in connection U.S. Appl. No. 13/904,936, filed May 29, 2013, 21 pages.

International Searching Authority, International Report on Patentability dated Dec. 10, 2015, issued in connection with International Application No. PCT/US2014/039669, filed May 28, 2014, 7 pages.

Japanese Patent Office, Japanese Office Action dated Jul. 12, 2016, issued in connection with Japanese Application No. 2014-550400, 10 pages.

Non-Final Office Action dated Aug. 12, 2016, issued in connection with U.S. Appl. No. 13/904,909, filed May 29, 2013, 21 pages.

Notice of Allowance dated Aug. 31, 2016, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 7 pages.

Ritchie et al., "UPnP AV Architecture:2 for UPnP Version 1.0", 2010, XP055032201, retrieved from the internet: URL: http://upnp.org/specs/av/UPnP-av_AVArchitecture-v2.pdf, 11 pages.

Advisory Action dated Dec. 5, 2016, issued in connection with U.S. Appl. No. 13/904,923, filed May 29, 2013, 5 pages.

US 9,967,615 B2

Page 6

(56)

References Cited

OTHER PUBLICATIONS

Canadian Patent Office, Canadian Office Action dated Nov. 3, 2016, issued in connection with Canadian Application No. 2,861,790, 4 pages.

European Patent Office, Extended European Search Report dated Nov. 21, 2016, issued in connection with European Application No. 14784965.7-1870, 6 pages.

European Patent Office, Summons to Attend Oral Proceedings dated Dec. 1, 2016, issued in connection with European Application No. 12861517.6-1905, 11 pages.

Japanese Patent Office, Notice of Rejection dated Dec. 20, 2016, issued in connection with Japanese Application No. 2016-509069, 4 pages.

"Denon 2003-2004 Product Catalog," Denon, 2003-2004, 44 pages.

Mate et al., "Movable-Multimedia: Session Mobility in Ubiquitous Computing Ecosystem", XP055019030, 2006, 6 pages.

Non-Final Office Action dated Dec. 14, 2016, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 5 pages.

Notice of Allowance dated Nov. 17, 2016, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 12 pages.

Notice of Allowance dated Nov. 23, 2016, issued in connection with U.S. Appl. No. 13/904,896, filed May 29, 2013, 18 pages.

Notice of Allowance dated Nov. 23, 2016, issued in connection with U.S. Appl. No. 13/904,932, filed May 29, 2013, 5 pages.

Notification of Reopening of Prosecution Due to Consideration of an Information Disclosure Statement Filed after Mailing of a Notice of Allowance dated Jan. 20, 2017, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 2 pages.

Supplemental Notice of Allowance dated Dec. 21, 2016, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 2 pages.

United States Patent and Trademark Office, U.S. Appl. No. 60/490,768, filed Jul. 28, 2003, entitled "Method for synchronizing audio playback between multiple networked devices," 13 pages.

United States Patent and Trademark Office, U.S. Appl. No. 60/825,407, filed Sep. 12, 2003, entitled "Controlling and manipulating groupings in a multi-zone music or media system," 82 pages.

Yamaha DME 64 Owner's Manual; copyright 2004, 80 pages.

Yamaha DME Designer 3.5 setup manual guide; copyright 2004, 16 pages.

Yamaha DME Designer 3.5 User Manual; Copyright 2004, 507 pages.

Australian Patent Office, Examination Report dated Mar. 22, 2017, issued in connection with Australian Application No. 2016202175, 3 pages.

Chen, Zhaofei et al. "What a Juke! A Collaborative Music Sharing System", World of Wireless, Mobile and Multimedia Networks (WOWMOM), 2012 IEEE International Symposium on A, IEEE, Jun. 25, 2012 6 pages.

Chinese Patent Office, Chinese Office Action dated Jan. 5, 2017, issued in connection with Chinese Application No. 201280069674.6, 14 pages.

European Patent Office, European Extended Search Report dated Aug. 16, 2017, issued in connection with EP Application No. 16160758.5, 9 pages.

European Patent Office, Office Action dated Apr. 7, 2017, issued in connection with European Application No. 14803651.0, 4 pages.

European Patent Office, Office Action dated May 11, 2017, issued in connection with European Application No. 14785247.9, 9 pages.

Final Office Action dated May 15, 2017, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 12 pages.

Final Office Action dated Sep. 20, 2017, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 22 pages.

Japanese Patent Office, Non-Final Office Action dated Mar. 28, 2017, issued in connection with Japanese Patent Application No. 2016-516750, 5 pages.

Japanese Patent Office, Office Action dated Jan. 10, 2017, issued in connection with Japanese Patent Application No. 2016-509046, 7 pages.

Japanese Patent Office, Office Action dated Feb. 14, 2017, issued in connection with Japanese Patent Application No. 2016-509047, 9 pages.

Non-Final Office Action dated Feb. 23, 2017, issued in connection with U.S. Appl. No. 13/904,923, filed May 29, 2013, 21 pages.

Non-Final Office Action dated Feb. 7, 2017, issued in connection with U.S. Appl. No. 14/520,578, filed Oct. 22, 2014, 5 pages.

Non-Final Office Action dated Mar. 9, 2017, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 20 pages.

Non-Final Office Action dated Feb. 22, 2017, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 14 pages.

Non-Final Office Action dated Jul. 26, 2017, issued in connection with U.S. Appl. No. 14/520,578, filed Oct. 22, 2014, 10 pages.

Notice of Allowance dated Apr. 4, 2017, issued in connection with U.S. Appl. No. 13/904,932, filed May 29, 2013, 5 pages.

Notice of Allowance dated Mar. 9, 2017, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 13 pages.

Notice of Allowance dated Aug. 17, 2017, issued in connection with U.S. Appl. No. 13/904,923, filed May 29, 2013, 23 pages.

Notice of Allowance dated Aug. 21, 2017, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 7 pages.

Notice of Allowance dated Jan. 25, 2017, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 7 pages.

Notice of Allowance dated Jun. 28, 2017, issued in connection with U.S. Appl. No. 13/904,896, filed May 29, 2013, 17 pages.

* cited by examiner

U.S. Patent

May 8, 2018

Sheet 1 of 11

US 9,967,615 B2

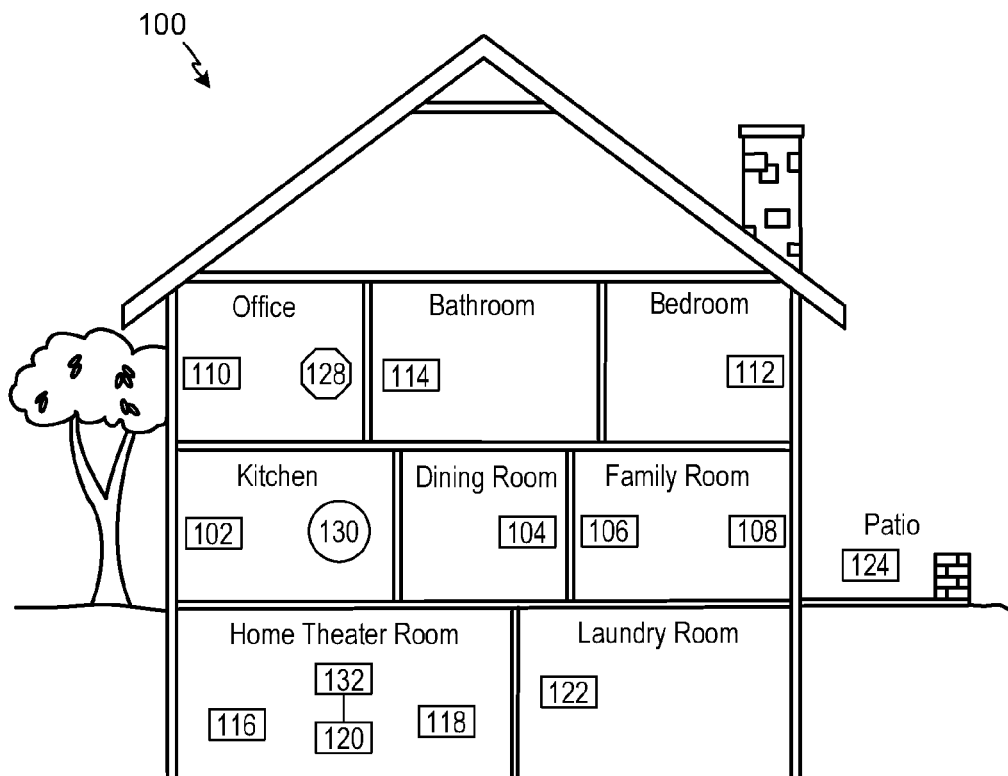


FIGURE 1

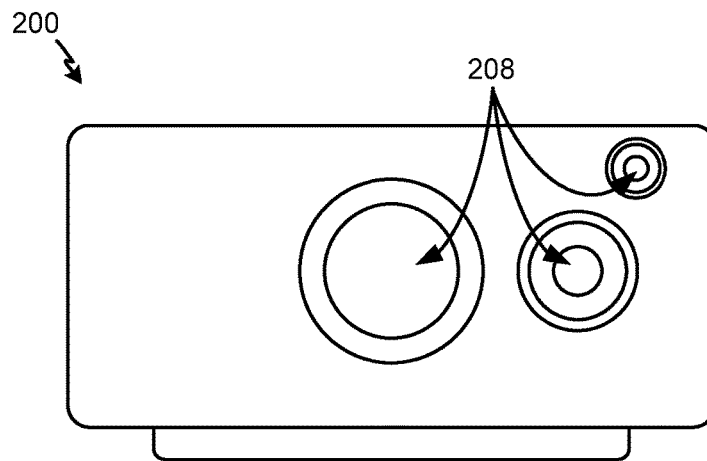


FIGURE 2A

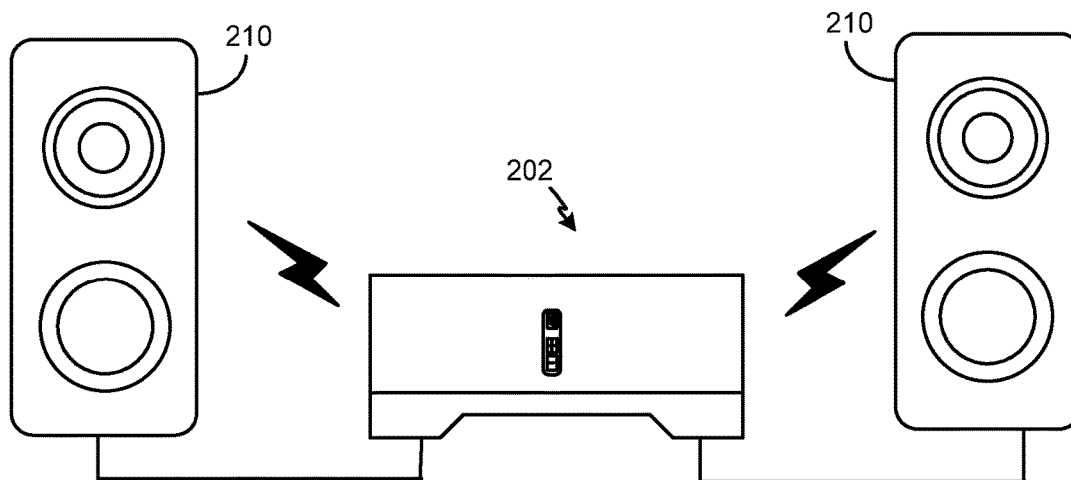


FIGURE 2B

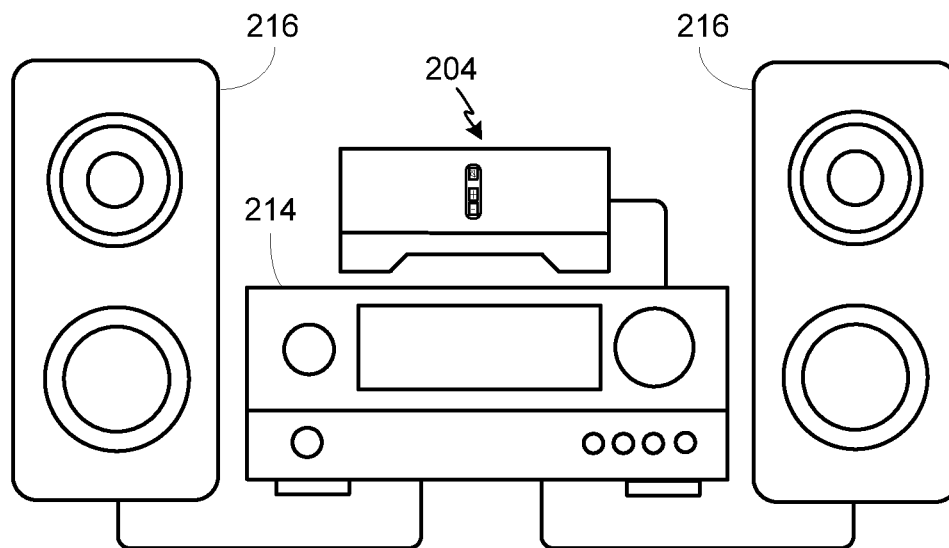


FIGURE 2C

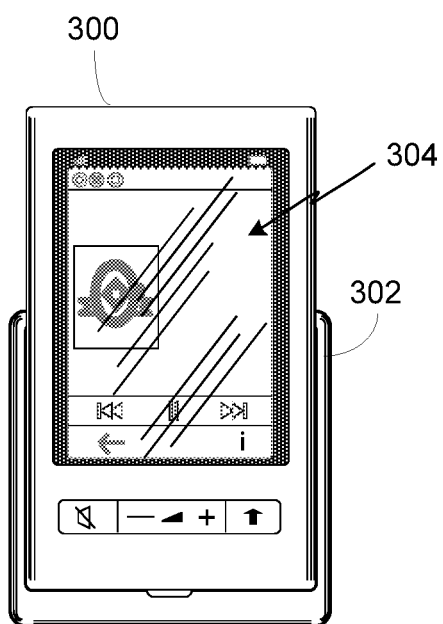


FIGURE 3

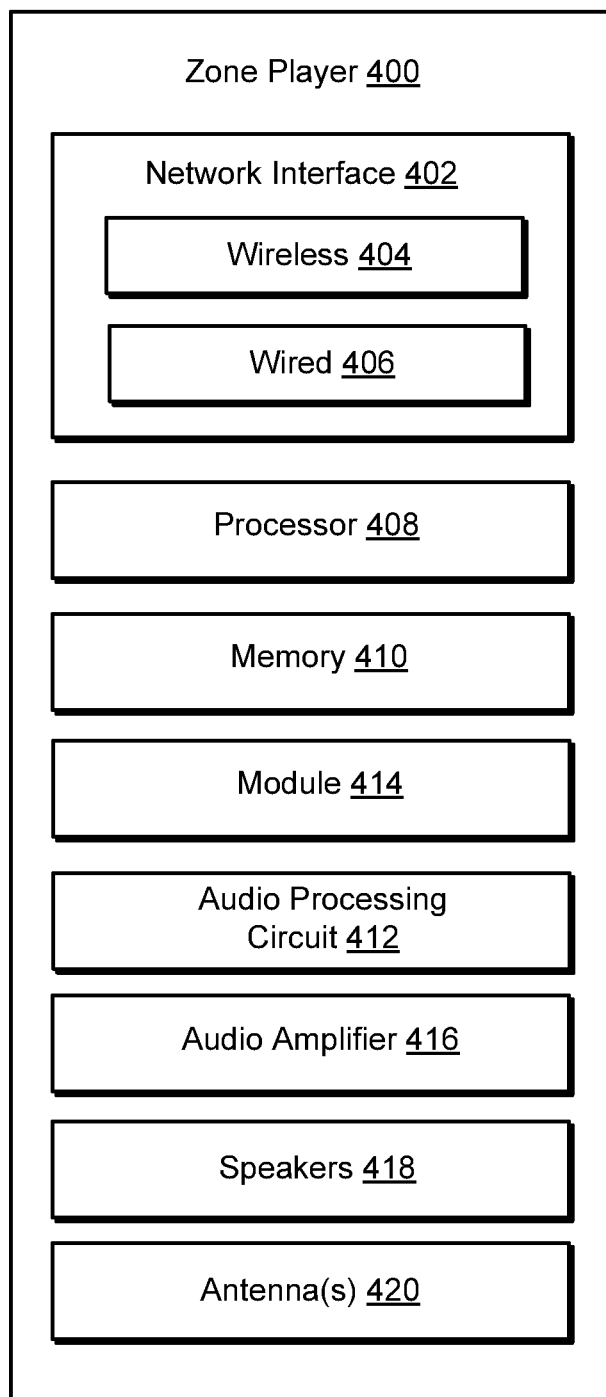


FIGURE 4

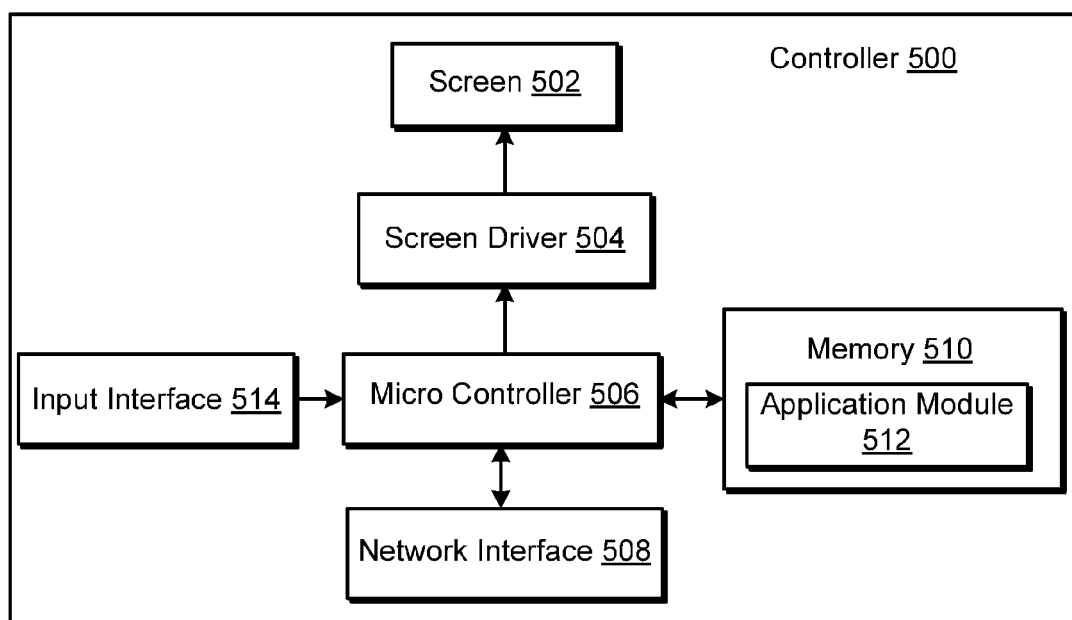


FIGURE 5

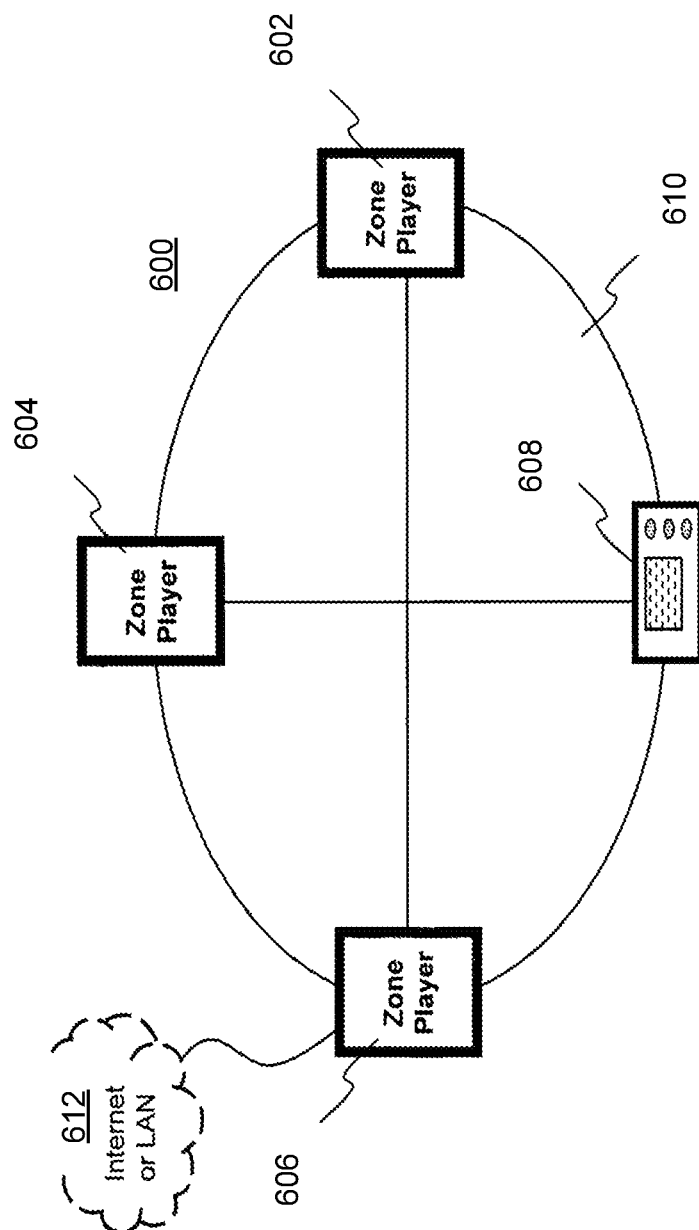


FIGURE 6

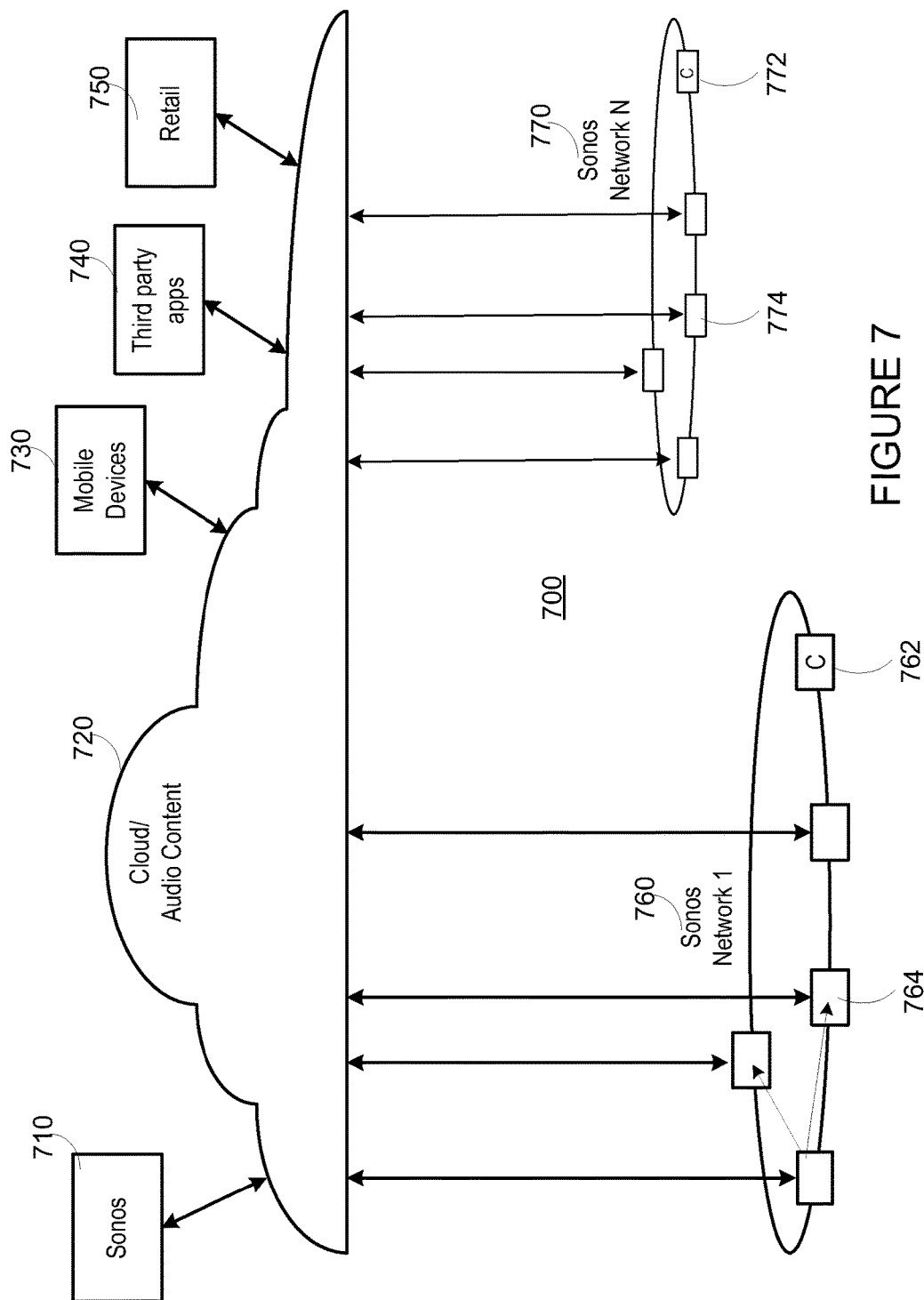


FIGURE 7

800 ↘

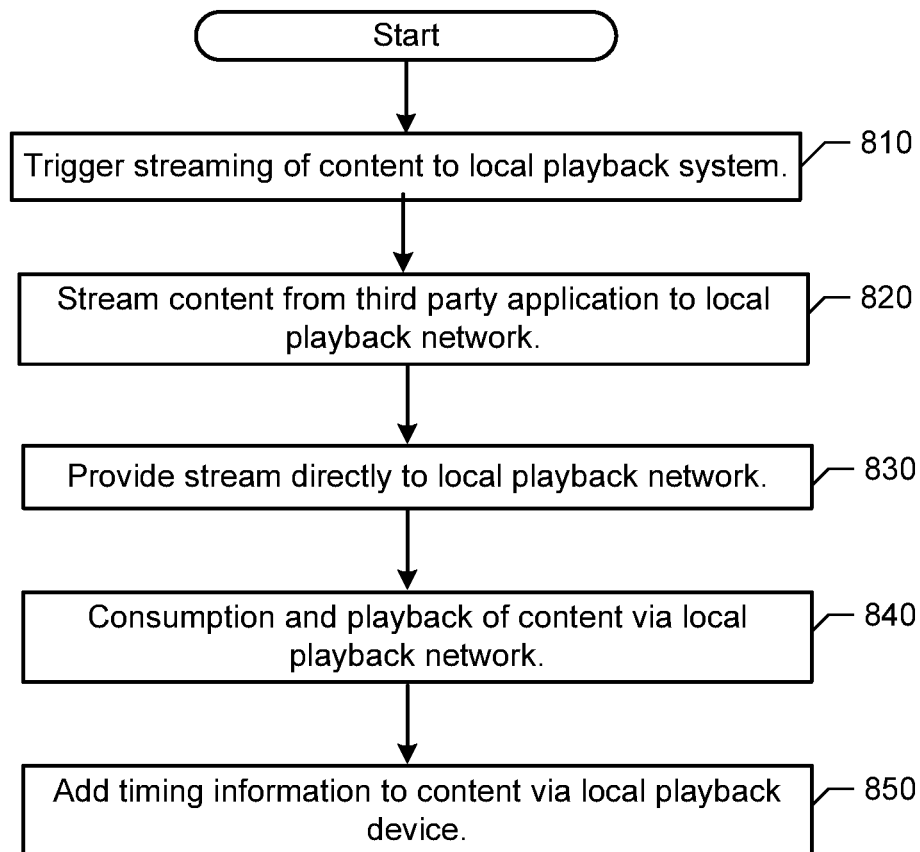


FIGURE 8

900 →

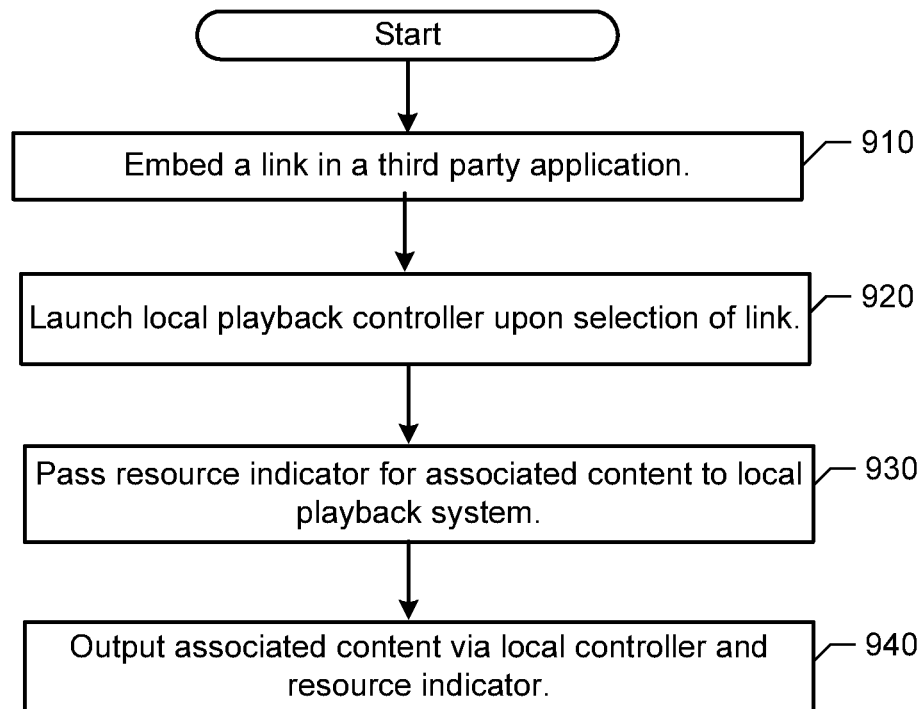


FIGURE 9

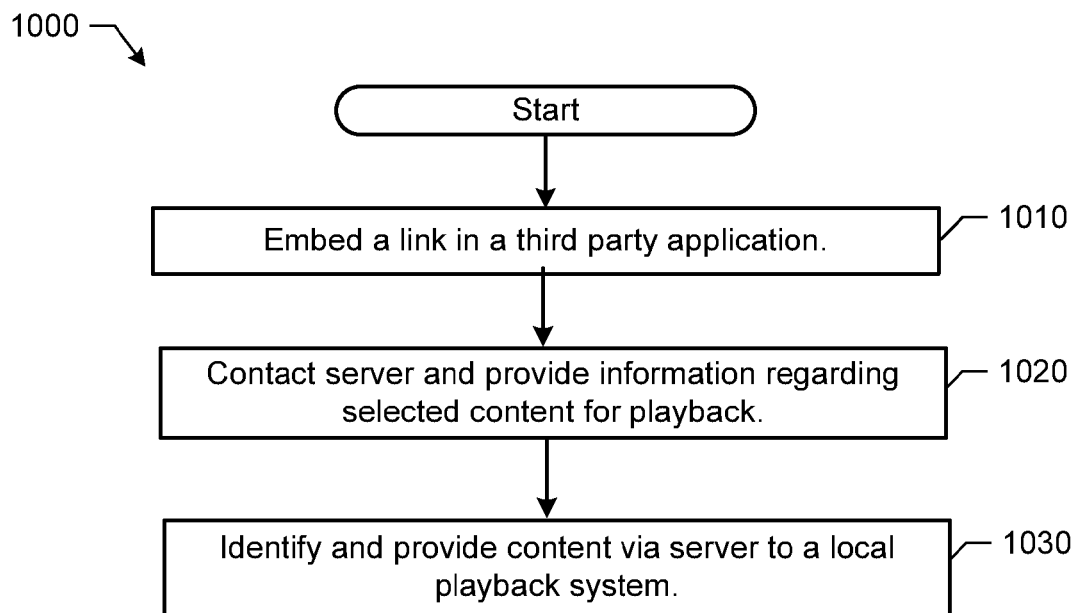


FIGURE 10

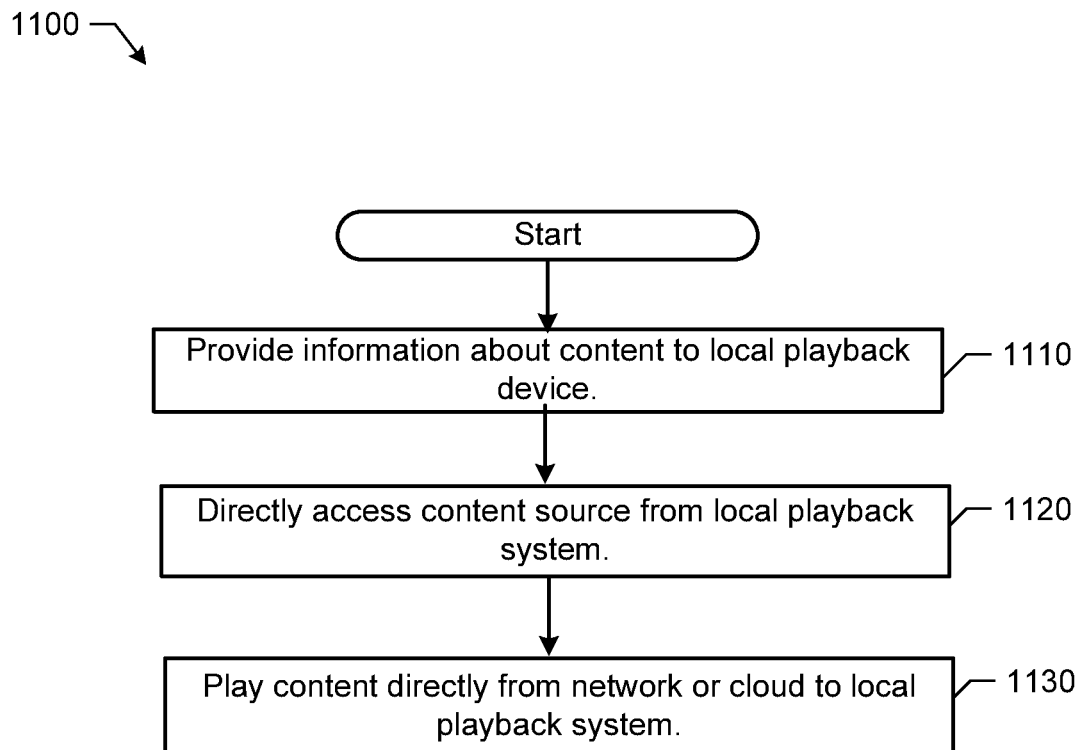


FIGURE 11

US 9,967,615 B2

1

NETWORKED MUSIC PLAYBACK**CROSS-REFERENCE TO RELATED APPLICATIONS**

The present application claims the benefit of priority to U.S. Non-Provisional application Ser. No. 13/341,237, filed on Dec. 30, 2011, entitled "Systems and Methods for Networked Music Playback", which is hereby incorporated by reference in its entirety for all purposes.

FIELD OF THE DISCLOSURE

The disclosure is related to consumer electronics and, more particularly, to providing music for playback via one or more devices on a playback data network.

BACKGROUND

Technological advancements have increased the accessibility of music content, as well as other types of media, such as television content, movies, and interactive content. For example, a user can access audio, video, or both audio and video content over the Internet through an online store, an Internet radio station, an online music service, an online movie service, and the like, in addition to the more traditional avenues of accessing audio and video content. Demand for such audio and video content continues to surge. Given the high demand, technology used to access and play such content has likewise improved.

BRIEF DESCRIPTION OF THE DRAWINGS

Features, aspects, and advantages of the presently disclosed technology are better understood with regard to the following description, appended claims, and accompanying drawings where:

FIG. 1 shows an illustration of an example system in which embodiments of the methods and apparatus disclosed herein can be implemented;

FIG. 2A shows an illustration of an example zone player having a built-in amplifier and speakers;

FIG. 2B shows an illustration of an example zone player having a built-in amplifier and connected to external speakers;

FIG. 2C shows an illustration of an example zone player connected to an A/V receiver and speakers;

FIG. 3 shows an illustration of an example controller;

FIG. 4 shows an internal functional block diagram of an example zone player;

FIG. 5 shows an internal functional block diagram of an example controller;

FIG. 6 shows an example ad-hoc playback network;

FIG. 7 shows a system including a plurality of networks including a cloud-based network and at least one local playback network; and

FIGS. 8-11 show flow diagrams for methods to provide audio content to a local playback system.

In addition, the drawings are for the purpose of illustrating example embodiments, but it is understood that the present disclosure is not limited to the arrangements and instrumentality shown in the drawings.

DETAILED DESCRIPTION**I. Overview**

Wired or wireless networks can be used to connect one or more multimedia playback devices for a home or other

2

location playback network (e.g., a home music system). Certain examples provide automatic configuration of parameters of a playback device to be coupled to a network with reduced or minimum human intervention. For example, a wired and/or wireless ad-hoc network is established to facilitate communications among a group of devices. Music and/or other multimedia content can be shared among devices and/or groups of devices (also referred to herein as zones) associated with a playback network.

Certain embodiments facilitate streaming or otherwise providing music from a music-playing application (e.g., browser-based application, native music player, other multimedia application, and so on) to a multimedia content playback (e.g., Sonos™) system. Certain embodiments provide simple, easy-to-use and secure systems and methods for multimedia content playback across a plurality of systems and locations. Certain embodiments facilitate integration between content partners and a playback system as well as supporting maintenance of such content and system.

Although the following discloses example systems, methods, apparatus, and articles of manufacture including, among other components, firmware and/or software executed on hardware, it should be noted that such systems, methods, apparatus, and/or articles of manufacture are merely illustrative and should not be considered as limiting. For example, it is contemplated that any or all of these firmware, hardware, and/or software components could be embodied exclusively in hardware, exclusively in software, exclusively in firmware, or in any combination of hardware, software, and/or firmware. Accordingly, while the following describes example systems, methods, apparatus, and/or articles of manufacture, the examples provided are not the only way(s) to implement such systems, methods, apparatus, and/or articles of manufacture.

When any of the appended claims are read to cover a purely software and/or firmware implementation, at least one of the elements in at least one example is hereby expressly defined to include a tangible medium such as a memory, DVD, CD, Blu-ray, and so on, storing the software and/or firmware.

Reference herein to "embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one example embodiment of the invention. The appearances of this phrase in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. As such, the embodiments described herein, explicitly and implicitly understood by one skilled in the art, can be combined with other embodiments.

Certain embodiments provide a method to provide content to a local playback network. The example method includes identifying multimedia content from a content provider. The example method includes passing information regarding the multimedia content to a local playback system including one or more multimedia playback devices in response to a trigger. The example method includes facilitating play of the multimedia content via a local playback network associated with the local playback system.

Certain embodiments provide a computer readable storage medium including instructions for execution by a processor, the instructions, when executed, cause the processor to implement a method to provide content to a local playback network. The example method includes identifying multimedia content from a content provider. The example method includes passing information regarding the multimedia content to a local playback system including one or

US 9,967,615 B2

3

more multimedia playback devices in response to a trigger. The example method includes facilitating play of the multimedia content via a local playback network associated with the local playback system.

Certain embodiments provide a multimedia playback device including a wireless communication interface to communicate with a local playback network and a multimedia content source and a processor. The process is to identify multimedia content from the multimedia content source; pass information regarding the multimedia content to device on the local playback network in response to a trigger; and facilitate play of the multimedia content via the devices on the local playback network.

II. Example Environment

Referring now to the drawings, in which like numerals can refer to like parts throughout the figures, FIG. 1 shows an example system configuration 100 in which one or more of the method and/or apparatus disclosed herein can be practiced or implemented. By way of illustration, the system configuration 100 represents a home with multiple zones. Each zone, for example, represents a different room or space, such as an office, bathroom, bedroom, kitchen, dining room, family room, home theater room, utility or laundry room, and patio. While not shown here, a single zone can cover more than one room or space. One or more of zone players 102-124 are shown in each respective zone. A zone player 102-124, also referred to as a playback device, multimedia unit, speaker, and so on, provides audio, video, and/or audiovisual output. A controller 130 (e.g., shown in the kitchen for purposes of illustration) provides control to the system configuration 100. The system configuration 100 illustrates an example whole house audio system, though it is understood that the technology described herein is not limited to its particular place of application or to an expansive system like a whole house audio system 100 of FIG. 1.

FIGS. 2A, 2B, and 2C show example illustrations of zone players 200-204. The zone players 200-204 of FIGS. 2A, 2B, and 2C, respectively, can correspond to any of the zone players 102-124 of FIG. 1. While certain embodiments provide multiple zone players, an audio output can be generated using only a single zone player. FIG. 2A illustrates a zone player 200 including sound producing equipment 208 capable of generating sound or an audio output corresponding to a signal received (e.g., wirelessly and/or via a wired interface). The sound producing equipment 208 of the zone player 200 of FIG. 2A includes a built-in amplifier (not shown in this illustration) and speakers (e.g., a tweeter, a mid-range driver, and/or a subwoofer). In certain embodiments, the zone player 200 of FIG. 2A can be configured to play stereophonic audio or monaural audio. In some embodiments, the zone player 200 of FIG. 2A can be configured as a component in a combination of zone players to play stereophonic audio, monaural audio, and/or surround audio. As described in greater detail below, in some embodiments, the example zone player 200 of FIG. 2A can also transmit a second signal to, for example, other zone player(s) in the same or different zone(s), speaker(s), receiver(s), and so on. Transmission of the second signal can be part of, for example, a system in which multiple zone players, speakers, receivers, and so on, form a network to, for example, present media content in a synchronization or distributed manner.

The example zone player 202 of FIG. 2B includes a built-in amplifier (not shown in this illustration) to power a set of detached speakers 210. The speakers 210 of FIG. 2B

4

can include, for example, any type of loudspeaker. The zone player 202 of FIG. 2B can communicate a signal corresponding to audio content to the detached speakers 210 via wired and/or wireless channels. Instead of receiving and generating audio content as in FIG. 2A, the zone player 202 of FIG. 2B receives the audio content and transmits the same (e.g., after processing the received signal) to the detached speakers 210. Similar to the example zone player 200 of FIG. 2A, in some embodiments the zone player 202 can transmit a second signal to, for example, other zone player(s) in the same or different zone(s), speaker(s), receiver(s), and so on.

The example zone player 204 of FIG. 2C does not include an amplifier, but allows a receiver 214, or another audio and/or video type device with built-in amplification, to connect to a data network 128 of FIG. 1 and to play audio received over the data network 128 via the receiver 214 and a set of detached speakers 216. In addition to the wired couplings shown in FIG. 2C, the detached speakers 216 can receive audio content via a wireless communication channel between the detached speakers 216 and, for example, the zone player 204 and/or the receiver 214. In some embodiments the zone player 202 can transmit a second signal to, for example, other zone player(s) in the same or different zone(s), speaker(s), receiver(s), and so on.

Example zone players include a “Sonos S5,” “Sonos Play:5,” “Sonos Play:3,” “ZonePlayer 120,” and “ZonePlayer 90,” which are offered by Sonos, Inc. of Santa Barbara, Calif. Any other past, present, and/or future zone players can additionally or alternatively be used to implement the zone players of example embodiments disclosed herein. A zone player can also be referred to herein as a playback device, and a zone player is not limited to the particular examples illustrated in FIGS. 2A, 2B, and 2C. For example, a zone player can include a wired or wireless headphone. In other examples, a zone player might include a subwoofer. In yet other examples, a zone player can include a sound bar. In an example, a zone player can include or interact with a docking station for an Apple iPod™ or similar device. In some embodiments, a zone player can relay one or more signals received from, for example, a first zone player to another playback device. In some embodiments, a zone player can receive a first signal and generate an output corresponding to the first signal and, simultaneously or separately, can receive a second signal and transmit or relay the second signal to another zone player(s), speaker(s), receiver(s), and so on. Thus, an example zone player described herein can act as a playback device and, at the same time, operate as a hub in a network of zone players. In such instances, media content corresponding to the first signal can be different from the media content corresponding to the second signal.

FIG. 3 shows an example illustration of a wireless controller 300 in a docking station 302. The controller 300 can correspond to the controlling device 130 of FIG. 1. The controller 300 is provided with a touch screen 304 that allows a user to interact with the controller 300, for example, to retrieve and navigate a playlist of audio items, control operations of one or more zone players, and provide overall control of the system configuration 100. In certain embodiments, any number of controllers can be used to control the system configuration 100. In certain embodiments, there can be a limit on the number of controllers that can control the system configuration 100. The controllers might be wireless like wireless controller 300 or wired to the data network 128. Furthermore, an application running on any network-enabled portable devices, such as an iPhone™ iPad™

5

Android™ powered phone, or any other smart phone or network-enabled device can be used as a controller by connecting to the data network 128. An application running on a laptop or desktop PC or Mac can also be used as a controller. Example controllers include a “Sonos® Controller 200,” “Sonos® Controller for iPhone,” “Sonos® Controller for iPad,” “Sonos® Controller for Android,” “Sonos® Controller for Mac or PC,” which are offered by Sonos, Inc. of Santa Barbara, Calif. The flexibility of such an application and its ability to be ported to a new type of portable device is advantageous.

Referring back to the system configuration 100 of FIG. 1, a particular zone can contain one or more zone players. For example, the family room of FIG. 1 contains two zone players 106 and 108, while the kitchen is shown with one zone player 102. Zones can be dynamically configured by positioning a zone player in a room or space and assigning via the controller 130 the zone player to a new or existing zone. As such, zones can be created, combined with another zone, removed, and given a specific name (e.g., “Kitchen”), if so programmed. The zone players 102 to 124 are coupled directly or indirectly to a data network, such as the data network 128 shown in FIG. 1. The data network 128 is represented by an octagon in the figure to stand out from other components shown in the figure. While the data network 128 is shown in a single location, it is understood that such a network can be distributed in and around the system configuration 100.

Particularly, the data network 128 can be a wired network, a wireless network, or a combination of both. In some embodiments, one or more of the zone players 102-124 are wirelessly coupled to the data network 128 based on a proprietary mesh network. In some embodiments, one or more of the zone players 102-124 are wirelessly coupled to the data network 128 using a non-mesh topology. In some embodiments, one or more of the zone players 102-124 are coupled via a wire to the data network 128 using Ethernet or similar technology. In addition to the one or more zone players 102-124 connecting to the data network 128, the data network 128 can further allow access to a wide area network, such as the Internet.

In certain embodiments, the data network 128 can be created by connecting any of the zone players 102-124, or some other connecting device, to a broadband router. Other zone players 102-124 can then be added wired or wirelessly to the data network 128. For example, a zone player (e.g., any of zone players 102-124) can be added to the system configuration 100 by simply pressing a button on the zone player itself, which enables a connection to be made to the data network 128. The broadband router can be connected to an Internet Service Provider (ISP), for example. The broadband router can be used to form another data network within the system configuration 100, which can be used in other applications (e.g., web surfing). The data network 128 can also be used in other applications, if so programmed. Further, in certain embodiments, the data network 128 is the same network used for other applications in the household.

In certain embodiments, each zone can play from the same audio source as another zone or each zone can play from a different audio source. For example, someone can be grilling on the patio and listening to jazz music via zone player 124, while someone is preparing food in the kitchen and listening to classical music via zone player 102. Further, someone can be in the office listening to the same jazz music via zone player 110 that is playing on the patio via zone player 124. In some embodiments, the jazz music played via zone players 110 and 124 is played in synchrony. Synchronizing playback amongst zones allows for someone to pass through zones while seamlessly listening to the audio. Further, zones can be put into a “party mode” such that all associated zones will play audio in synchrony.

6

In certain embodiments, a zone contains two or more zone players. For example, the family room contains two zone players 106 and 108, and the home theater room contains at least zone players 116, 118, and 120. A zone can be configured to contain as many zone players as desired, and for example, the home theater room might contain additional zone players to play audio from a 5.1 channel or greater audio source (e.g., a movie encoded with 5.1 or greater audio channels). If a zone contains two or more zone players, such as the two zone players 106 and 108 in the family room, then the two zone players 106 and 108 can be configured to play the same audio source in synchrony, or the two zone players 106 and 108 can be paired to play two separate sounds in left and right channels, for example. In other words, the stereo effects of a sound can be reproduced or enhanced through the two zone players 106 and 108, one for the left sound and the other for the right sound. In certain embodiments, paired zone players can play audio in synchrony with other zone players.

In certain embodiments, three or more zone players can be configured to play various channels of audio that is encoded with three channels or more sound. For example, the home theater room shows zone players 116, 118, and 120. If the sound is encoded as 2.1 channel audio, then the zone player 116 can be configured to play left channel audio, the zone player 118 can be configured to play right channel audio, and the zone player 120 can be configured to play bass frequencies. Other configurations are possible and depend on the number of zone players and the type of audio. Further, a particular zone can be configured to play a 5.1 channel audio in one instance, such as when playing audio from a movie, and then dynamically switch to play stereo, such as when playing audio from a two channel source.

In certain embodiments, two or more zone players can be sonically consolidated to form a single, consolidated zone player. A consolidated zone player (though made up of multiple, separate devices) can be configured to process and reproduce sound differently than an unconsolidated zone player or zone players that are paired, because a consolidated zone player will have additional speaker drivers from which sound can be passed. The consolidated zone player can further be paired with a single zone player or yet another consolidated zone player. Each playback device of a consolidated playback device is preferably set in a consolidated mode.

According to some embodiments, one can continue to do any of: group, consolidate, and pair zone players, for example, until a desired configuration is complete. The actions of grouping, consolidation, and pairing are preferably performed through a control interface, such as using controller 130, and not by physically connecting and reconnecting speaker wire, for example, to individual, discrete speakers to create different configurations. As such, certain embodiments described herein provide a more flexible and dynamic platform through which sound reproduction can be offered to the end-user.

Sources of audio content to be played by zone players 102-124 are numerous. Music from a personal library stored on a computer or networked-attached storage (NAS) can be accessed via the data network 128 and played. Internet radio stations, shows, and podcasts can be accessed via the data network 128. Music services that let a user stream and download music and audio content can be accessed via the

data network 128. Further, music can be obtained from traditional sources, such as a turntable or CD player, via a line-in connection to a zone player, for example. Audio content can also be accessed through AirPlay™ wireless technology by Apple, Inc., for example. Audio content received from one or more sources can be shared amongst the zone players 102 to 124 via the data network 128 and/or the controller 130. The above-disclosed sources of audio content are referred to herein as network-based audio information sources. However, network-based audio information sources are not limited thereto.

The example home theater zone players 116, 118, 120 are coupled to an audio information source such as a television 132. In some examples, the television 132 is used as a source of audio for the home theater zone players 116, 118, 120, while in other examples audio information from the television 132 can be shared with any of the zone players 102-124 in the audio system 100.

III. Example Playback Device

Referring now to FIG. 4, there is shown an example functional block diagram of a zone player 400 in accordance with an embodiment. The zone player 400 of FIG. 4 includes a network interface 402, a processor 408, a memory 410, an audio processing component 412, a module 414, an audio amplifier 416, and a speaker unit 418 coupled to the audio amplifier 416. FIG. 2A shows an example illustration of such a zone player. Other types of zone players can not include the speaker unit 418 (e.g., such as shown in FIG. 2B) or the audio amplifier 416 (e.g., such as shown in FIG. 2C). Further, it is contemplated that the zone player 400 can be integrated into another component. For example, the zone player 400 could be constructed as part of a lamp for indoor or outdoor use.

Referring back to FIG. 4, the network interface 402 facilitates a data flow between zone players and other devices on a data network (e.g., the data network 128 of FIG. 1) and the zone player 400. In some embodiments, the network interface 402 can manage the assembling of an audio source or file into smaller packets that are to be transmitted over the data network or reassembles received packets into the original source or file. In some embodiments, the network interface 402 can further handle the address part of each packet so that it gets to the right destination or intercepts packets destined for the zone player 400. Accordingly, in certain embodiments, each of the packets includes an Internet Protocol (IP)-based source address as well as an IP-based destination address.

In some embodiments, the network interface 402 can include one or both of a wireless interface 404 and a wired interface 406. The wireless interface 404, also referred to as an RF interface, provides network interface functions for the zone player 400 to wirelessly communicate with other devices (e.g., other zone player(s), speaker(s), receiver(s), component(s) associated with the data network 128, and so on) in accordance with a communication protocol (e.g., any of the wireless standards IEEE 802.11a, 802.11b, 802.11g, 802.11n, or 802.15). To receive wireless signals and to provide the wireless signals to the wireless interface 404 and to transmit wireless signals, the zone player 400 of FIG. 4 includes one or more antennas 420. The wired interface 406 provides network interface functions for the zone player 400 to communicate over a wire with other devices in accordance with a communication protocol (e.g., IEEE 802.3). In some embodiments, a zone player includes both of the

interfaces 404 and 406. In some embodiments, a zone player 400 includes only the wireless interface 404 or the wired interface 406.

In some embodiments, the processor 408 is a clock-driven electronic device that is configured to process input data according to instructions stored in memory 410. The memory 410 is data storage that can be loaded with one or more software modules 414, which can be executed by the processor 408 to achieve certain tasks. In the illustrated embodiment, the memory 410 is a tangible machine readable medium storing instructions that can be executed by the processor 408. In some embodiments, a task might be for the zone player 400 to retrieve audio data from another zone player or a device on a network. In some embodiments, a task might be for the zone player 400 to send audio data to another zone player or device on a network. In some embodiments, a task might be for the zone player 400 to synchronize playback of audio with one or more additional zone players. In some embodiments, a task might be to pair the zone player 400 with one or more zone players to create a multi-channel audio environment. Additional or alternative tasks can be achieved via the one or more software modules 414 and the processor 408.

The audio processing component 412 can include one or more digital-to-analog converters (DAC), an audio preprocessing component, an audio enhancement component or a digital signal processor, and so on. In certain embodiments, the audio that is retrieved via the network interface 402 is processed and/or intentionally altered by the audio processing component 412. Further, the audio processing component 412 can produce analog audio signals. The processed analog audio signals are then provided to the audio amplifier 416 for play back through speakers 418. In addition, the audio processing component 412 can include necessary circuitry to process analog or digital signals as inputs to play from zone player 400, send to another zone player on a network, or both play and send to another zone player on the network. An example input includes a line-in connection (e.g., an auto-detecting 3.5 mm audio line-in connection).

The audio amplifier 416 is a device that amplifies audio signals to a level for driving one or more speakers 418. The one or more speakers 418 can include an individual transducer (e.g., a “driver”) or a complete speaker system that includes an enclosure including one or more drivers. A particular driver can be a subwoofer (for low frequencies), a mid-range driver (middle frequencies), and a tweeter (high frequencies), for example. An enclosure can be sealed or ported, for example.

A zone player 400 can also be referred to herein as a playback device. An example playback device includes a Sonos® Play:5, which is manufactured by Sonos, Inc. of Santa Barbara, Calif. The Play:5 is an example zone player with a built-in amplifier and speakers. In particular, the Play:5 is a five-driver speaker system that includes two tweeters, two mid-range drivers, and one subwoofer. When playing audio content via the Play:5, the left audio data of a track is sent out of the left tweeter and left mid-range driver, the right audio data of a track is sent out of the right tweeter and the right mid-range driver, and mono bass is sent out of the subwoofer. Further, both mid-range drivers and both tweeters have the same equalization (or substantially the same equalization). That is, they are both sent the same frequencies, just from different channels of audio. Audio from Internet radio stations, online music and video services, downloaded music, analog audio inputs, television, DVD, and so on, can be played from a Sonos® Play:5. While the Play:5 is an example of a zone player with

speakers, it is understood that a zone player with speakers is not limited to one with a certain number of speakers (e.g., five speakers as in the Play:5), but rather can contain one or more speakers. Further, a zone player can be part of another device, which might even serve a purpose different than audio (e.g., a lamp).

IV. Example Controller

Referring now to FIG. 5, there is shown an example controller 500, which can correspond to the controlling device 130 in FIG. 1. The controller 500 can be used to facilitate the control of multi-media applications, automation and others in a system. In particular, the controller 500 is configured to facilitate a selection of a plurality of audio sources available on the network and enable control of one or more zone players (e.g., the zone players 102-124 in FIG. 1) through a wireless network interface 508. According to one embodiment, the wireless communications is based on an industry standard (e.g., infrared, radio, wireless standards IEEE 802.11a, 802.11b 802.11g, 802.11n, or 802.15). Further, when a particular audio is being accessed via the controller 500 or being played via a zone player, a picture (e.g., album art) or any other data, associated with the audio source can be transmitted from a zone player or other electronic device to the controller 500 for display.

The controller 500 is provided with a screen 502 and an input interface 514 that allows a user to interact with the controller 500, for example, to navigate a playlist of many multimedia items and to control operations of one or more zone players. The screen 502 on the controller 500 can be an LCD screen, for example. The screen 500 communicates with and is commanded by a screen driver 504 that is controlled by a microcontroller (e.g., a processor) 506. The memory 510 can be loaded with one or more application modules 512 that can be executed by the microcontroller 506 with or without a user input via the user interface 514 to achieve certain tasks. In some embodiments, an application module 512 is configured to facilitate grouping a number of selected zone players into a zone group and synchronizing the zone players for audio play back. In some embodiments, an application module 512 is configured to control the audio sounds (e.g., volume) of the zone players in a zone group. In operation, when the microcontroller 506 executes one or more of the application modules 512, the screen driver 504 generates control signals to drive the screen 502 to display an application specific user interface accordingly.

The controller 500 includes a network interface 508 that facilitates wireless communication with a zone player. In some embodiments, the commands such as volume control and audio playback synchronization are sent via the network interface 508. In some embodiments, a saved zone group configuration is transmitted between a zone player and a controller via the network interface 508. The controller 500 can control one or more zone players, such as 102-124 of FIG. 1. There can be more than one controller for a particular system. Further, a controller can be integrated into a zone player.

It should be noted that other network-enabled devices such as an iPhone®, iPad® or any other smart phone or network-enabled device (e.g., a networked computer such as a PC or Mac®) can also be used as a controller to interact or control zone players in a particular environment. In some embodiments, a software application or upgrade can be downloaded onto a network enabled device to perform the functions described herein.

In certain embodiments, a user can create a zone group including at least two zone players from the controller 500. The zone players in the zone group can play audio in a synchronized fashion, such that all of the zone players in the zone group play back an identical audio source or a list of identical audio sources in a synchronized manner such that no (or substantially no) audible delays or hiccups could be heard. Similarly, in some embodiments, when a user increases the audio volume of the group from the controller 500, the signals or data of increasing the audio volume for the group are sent to one of the zone players and causes other zone players in the group to be increased together in volume.

A user via the controller 500 can group zone players into a zone group by activating a “Link Zones” or “Add Zone” soft button, or de-grouping a zone group by activating an “Unlink Zones” or “Drop Zone” button. For example, one mechanism for ‘joining’ zone players together for audio play back is to link a number of zone players together to form a group. To link a number of zone players together, a user can manually link each zone player or room one after the other. For example, assume that there is a multi-zone system that includes the following zones: Bathroom, Bedroom, Den, Dining Room, Family Room, and Foyer.

In certain embodiments, a user can link any number of the six zone players, for example, by starting with a single zone and then manually linking each zone to that zone.

In certain embodiments, a set of zones can be dynamically linked together using a command to create a zone scene or theme (subsequent to first creating the zone scene). For instance, a “Morning” zone scene command can link the Bedroom, Office, and Kitchen zones together in one action. Without this single command, the user would need to manually and individually link each zone. The single command might include a mouse click, a double mouse click, a button press, a gesture, or some other programmed action. Other kinds of zone scenes can be programmed.

In certain embodiments, a zone scene can be triggered based on time (e.g., an alarm clock function). For instance, a zone scene can be set to apply at 8:00 am. The system can link appropriate zones automatically, set specific music to play, and then stop the music after a defined duration. Although any particular zone can be triggered to an “On” or “Off” state based on time, for example, a zone scene enables any zone(s) linked to the scene to play a predefined audio (e.g., a favorable song, a predefined playlist) at a specific time and/or for a specific duration. If, for any reason, the scheduled music failed to be played (e.g., an empty playlist, no connection to a share, failed Universal Plug and Play (UPnP), no Internet connection for an Internet Radio station, and so on), a backup buzzer can be programmed to sound. The buzzer can include a sound file that is stored in a zone player, for example.

V. Example Ad-Hoc Network

Certain particular examples will now be provided in connection with FIGS. 6-8B to describe, for purposes of illustration only, certain base systems and methods to provide and facilitate connection to a playback network. FIG. 6 shows that there are three zone players 602, 604 and 606 and a controller 608 that form a network branch that is also referred to as an Ad-Hoc network 610. The network 610 may be wireless, wired, or a combination of wired and wireless. In general, an Ad-Hoc (or “spontaneous”) network is a local area network or other small network in which there is no one access point for all traffic. With an established Ad-Hoc network 610, the devices 602, 604, 606 and 608 can all

US 9,967,615 B2

11

communicate with each other in a “peer-to-peer” style of communication, for example. Furthermore, devices may come/and go from the network **610**, and the network **610** will automatically reconfigure itself without needing the user to reconfigure the network **610**.

Using the Ad-Hoc network **610**, the devices **602**, **604**, **606**, and **608** can share or exchange one or more audio sources and be grouped to play the same or different audio sources. For example, the devices **602** and **604** are grouped to playback one piece of music, and at the same time, the device **606** plays back another piece of music. In other words, the devices **602**, **604**, **606** and **608**, as shown in FIG. 6, form a HOUSEHOLD that distributes audio and/or reproduces sound. As used herein, the term HOUSEHOLD (provided in uppercase letters to disambiguate from the user’s domicile) is used to represent a collection of networked devices that are cooperating to provide an application or service. An instance of a HOUSEHOLD is identified with a household **10** (or household identifier).

In certain embodiments, a household identifier (HHID) is a short string or an identifier that is computer-generated to help ensure that it is unique. Accordingly, the network **610** can be characterized by a unique HHID and a unique set of configuration variables or parameters, such as channels (e.g., respective frequency bands), SSID (a sequence of alphanumeric characters as a name of a wireless network), and WEP keys (wired equivalent privacy or other security keys). In certain embodiments, SSID is set to be the same as HHID.

In certain embodiments, each HOUSEHOLD includes two types of network nodes: a control point (CP) and a zone player (ZP). The control point controls an overall network setup process and sequencing, including an automatic generation of required network parameters (e.g., WEP keys). In an embodiment, the CP also provides the user with a HOUSEHOLD configuration user interface. The CP function can be provided by a computer running a CP application module, or by a handheld controller (e.g., the controller **308**) also running a CP application module, for example. The zone player is any other device on the network that is placed to participate in the automatic configuration process. The ZP, as a notation used herein, includes the controller **308** or a computing device, for example.

In certain embodiments, configuration of a HOUSEHOLD involves multiple CPs and ZPs that rendezvous and establish a known configuration such that they can use a standard networking protocol (e.g., IP over Wired or Wireless Ethernet) for communication. In an embodiment, two types of networks/protocols are employed: Ethernet 802.3 and Wireless 802.11g. Interconnections between a CP and a ZP can use either of the networks/protocols. A device in the system as a member of a HOUSEHOLD can connect to both networks simultaneously. In an environment that has both networks in use, it is assumed that at least one device in a system is connected to both as a bridging device, thus providing bridging services between wired/wireless networks for others. The zone player **606** in FIG. 6 is shown to be connected to both networks, for example. The connectivity to the network **612** is based on Ethernet while the connectivity to other devices **602**, **604** and **608** is based on Wireless. It is understood, however, that in some embodiments each zone player **606**, **604**, **602** may access the Internet when retrieving media from the cloud (e.g., Internet) via the bridging device. For example, zone player **602**

12

URL, the zone player **602** may retrieve the audio track from the cloud, and ultimately play the audio out of one or more zone players.

VI. Example Music Sharing and Playback Configuration

Certain embodiments enable a user to stream music from a music-playing application (e.g., browser-based application, native music player, other multimedia application, and so on) to a local multimedia content playback (e.g., Sonos™) system. Certain embodiments provide secure systems and methods for multimedia content playback across a plurality of systems and locations. Certain embodiments facilitate integration between content partners and a playback system as well as supporting maintenance of such content and system.

FIG. 7 shows a system including a plurality of networks including a cloud-based network and at least one local playback network. The network includes a plurality of playback devices or players, though it is understood that the network may contain only one playback device. In certain embodiments, each player has an ability to retrieve its content for playback. Control and content retrieval can be distributed or centralized, for example. Input can include streaming content provider input, third party application input, mobile device input, user input, and/or other playback network input into the cloud for local distribution and playback.

As illustrated by the example system **700** of FIG. 7, a plurality of content providers **720-750** can be connected to one or more local playback networks **760-770** via a cloud and/or other network **710**. Using the cloud **710**, a multimedia playback system **720** (e.g., Sonos™), a mobile device **730**, a third party application **740**, a retail location **750**, and so on can provide multimedia content (requested or otherwise) to local playback networks **760**, **770**. Within each local network **760**, **770**, a controller **762**, **772** and/or playback device **764**, **774** can provide a song identifier, song name, playlist identifier, playlist name, genre, preference, and so on, and/or simply receive content from a connected system via the cloud.

For example, a user listens to a third party music application (e.g., Pandora™ Rhapsody™, Spotify™, and so on) on her smart phone while commuting. She’s enjoying the current channel and, as she walks in the door to her home, selects an option to continue playing that channel on her household music playback system (e.g., Sonos™). The playback system picks up from the same spot on the selected channel that was on her phone and outputs that content (e.g., that song) on speakers and/or other playback devices connected to the household playback system. A uniform resource indicator (URI) (e.g., a uniform resource locator (URL)) can be passed to a playback device to fetch content from a cloud and/or other networked source, for example. A playback device, such as a zone player, can fetch content on its own without use of a controller, for example. Once the zone player has a URL (or some other identification or address) for a song and/or playlist, the zone player can run on its own to fetch the content. Songs and/or other multimedia content can be retrieved from the Internet rather than a local device (e.g., a compact disc (CD)), for example. A third party application can open or utilize an application programming interface (API) to pass music to the household playback system without tight coupling to that household playback system.

13

In another example of an application determining a playlist and/or other content for playback, a user enjoys listening to music on an online music service (e.g., turntable.fm or other virtual room that a user can enter to choose from a plurality of online disc jockeys (DJs) deciding what to play next) using his Mac Book Pro™ at home. He likes the unique user experience the service offers, and he frequently hops from room to room discovering new music. To maximize sound quality, he plays the music on his household playback system (e.g., Sonos™). A button or other indicator can be added to the turntable.fm Web application to switch the content being played to the playback system for output (e.g., to the Sonos™ system rather than or in addition to the Mac Book™). While Web-based applications typically do not have access to items on a local network, certain embodiments enable a third-party Web-based application (e.g., Turntable.fm) to talk to a playback system (e.g., Sonos™) in a certain way (e.g., may have to log in with a username and password), and the identified user has the website send audio or audio and video down to a playback device (e.g., a zone player) on the playback system local network to play music there (or some other media).

In another example, a first user creates a playlist (e.g., a Spotify™ playlist). The first user visits a second user's house, pulls out her smart phone and shares her playlist by playing it on the second user's household playback (e.g., Sonos™) system using her third party (e.g., Spotify™) application. The first user may also go to the third party content provider's (e.g., Spotify's™) website and share her playlist on the second user's playback system.

Thus, certain embodiments provide cross-service linking such that a song identifier can be passed from one user and/or service to another to be fetched and played. A user having a playlist on his or her phone can visit a friend and, using her account on her friend's system, play a song to which she has an access right. A retrieved song can be streamed locally to a user's phone, or an application can pass a song identifier to a local playback system which looks up the song identifier and finds an available audio stream to which the user has a right to play and then plays that song.

In another example, a user is staying in a hotel room or other facility including a local playback network. For example, a speaker and/or other playback device (e.g., a Sonos™ Play:3, Play: 5 and so on) in a hotel room can be utilized to play multimedia content to which the user has access from his or her playback network account, streaming audio source, third party application, and so on. Content can be output to one or more devices based on availability, access, configuration, priority, preference, and so on. In certain embodiments, a playback network includes a plurality of nodes, and each node has a capability to play sound in response to an input. Requested output is provided to a most logical connection, for example.

In certain embodiments, a phone device, a television device, and so on can be used to play music, audio, video and/or other multimedia content. In an example, a push button on a microphone or household intercom system to tell the kids dinner is ready is provided over the local playback network.

FIG. 8 shows a flow diagram for a method 800 to provide audio content to a local playback system. In the example method 800 of FIG. 8, a third party application acts as a "virtual line-in" to the local playback system. At block 810, streaming of music or other content from a third party application to a local content playback system is triggered. For example, a "Play to Sonos" button is pressed on a Rhapsody™ application. At block 820, content is streamed

14

to one or more components in a household playback network. The music may be streamed to predetermined zones or players in a household, for example. The music may be further directed to be played in different zones or players throughout the household. Playback on the local network can be facilitated to one or more zones/players based on a configuration (e.g., a zone scene, theme, and so on). Thus, certain embodiments allow a large degree of flexibility in where the music is actually played. For example, the music can be played in the kitchen, the family room, the patio, and so on. Further, the music may be redirected to different zones.

At block 830, the incoming content (e.g., audio) stream is provided directly from a third party application or other external source to the local playback network for playback. For example, rather than passing track identifiers, an audio stream is provided to a Sonos household system for playback to one or more configured zones. At block 840, the local playback system consumes the stream and plays it as it would other content on the local playback (e.g., Sonos™) network (e.g., via zones and so on). At block 850, a playback device (e.g., a zone player, Play:3™, Play:5™, and so on) adds timing information to the streaming content signal (e.g., the device takes the streaming audio signal and repackages it for local synchronized playback). In some embodiments, timing information is not added to the signal unless two or more playback devices are configured to play the audio in synchrony.

FIG. 9 shows a flow diagram for a method 900 to provide audio content to a local playback system. In the example method 900 of FIG. 9, a uniform resource indicator (URI) handler approach is provided for content output. At block 910, a link or other reference is embedded in a third party application (e.g., Facebook™ or Twitter). At block 920, when the link is selected (e.g., clicked), a local playback (e.g., Sonos™) controller, if available, is launched. At block 930, the application (e.g., accessed on a phone, tablet, computer, and so on) passes a URI for associated content (e.g., an audio track and so on) to a local playback system (e.g., Sonos™) controller. At block 940, the local controller outputs the associated content (e.g., plays the music) via the URI. For example, music is streamed from the cloud to one or more playback devices on the local playback network.

In certain embodiments, an application associated with the operating system can register to handle all URIs (URLs) that start with a certain prefix and can define how data is encoded into those URLs so a local playback system application can generate a link (e.g., "sonos:") and put that link into a message (e.g., email, text message, instant message (IM), etc.). The local playback application registered to handle such URLs can parse the URLs to determine what song, playlist, streaming radio station, etc., to play. This launches the controller application. For example, if a first listener likes a song and tweets that song, Twitter™ can include a clickable link which launches a playback application and starts the music playing on a local playback system if the local system can find the song (e.g., if have the application, if have rights/access to the song, etc.). In certain embodiments, the system knows to trigger the receiving user's system rather than the sending user's system to play associated content based on the transmitted link/identifier.

For example, an application can register with the system to handle all URLs that start with a custom prefix (e.g., an HTTP "scheme"). For instance, Sonos controller apps can register to handle any URL that begins with "sonos:" or "x-sonos:". In certain embodiments, a playback system provider can define and publish the format of its URLs so

15

that any third party application can create a link or reference to content. A large amount of data can be encoded into a URL using query parameters, for example.

In an example, when an application tries to “open” or “browse” to a URL, the system checks to see if the scheme of the URL matches the “sonos:” scheme that has been registered with the application. If a URL handler application is found, the system launches that application (e.g., the application can but does not need to be running in the background) and passes the URL to the application. The application then parses the URL and executes functionality based on the data in the URL. For example, the URL can contain the name of a music service and a playlist identifier from that service, plus the name of a Sonos™ Zone Player, causing the Sonos controller to start that playlist playing on that zone.

FIG. 10 shows a flow diagram for a method 1000 to provide audio content to a local playback system. In the example method 1000 of FIG. 10, at block 1010, a link or other reference is embedded in a third party application (e.g., Facebook™). At block 1020, when the link is selected, a playback system (e.g., Sonos™) server is contacted and provided with information regarding selected content for playback. For example, rather than launching a local controller application, a server is contacted regarding music for playback on a local network. At block 1030, using the provided information, the server identifies and provides the content locally on a user’s local playback system. For example, the server can then start playing the music directly on the user’s Sonos™ system (e.g., without going through a Sonos™ controller application).

In certain embodiments, a “single sign-on” technology is provided so that the user does not need to re-enter a username and password in order to authenticate to the playback server. Example single sign-on technologies include Facebook Connect™, Windows Live ID™, etc.

In certain embodiments, instead of using a specialized link, such as a “sonos:” link, a normal URL can be used to point to a playback system (e.g., Sonos™) webserver, which generates links with special data embedded in the link. A playback system is identified, and content identified by the URL can be playing at via the local playback network (e.g., mesh network configured for home, hotel room, etc.). Parameters such as authentication, security, location, and so on can be configured for local playback of remote content.

FIG. 11 shows a flow diagram for a method 1100 to provide audio content to a local playback system. The example method 1100 of FIG. 11 provides a “throw it over the wall” approach to content delivery to a local playback system. At block 1110, a third party application provides a multimedia playback device (e.g., a Sonos™ zone player (ZP)) with enough information about content (e.g., an audio track) so that, at block 1120, the local playback system (e.g., SonosNet™) can directly access a source of the content and, at block 1130, play the content directly off the network (e.g., the Internet) or cloud.

In certain embodiments, a local playback controller application is not involved. Information passed over to the local playback device may include an identifier for a single track, a playlist, a streaming radio station, a programmed radio station, and so on. This information can also include a current play position within a list to enable near-seamless “handoff” of music from a portable device to a local playback system. Once the music information is handed from the third-party application to the local playback system, there is no further synchronization between the two systems.

16

A connection between the third-party application and the local playback device (e.g., Sonos ZonePlayer™) can be direct over a local area network (LAN), remote through a proxy server in the cloud, and so on. A LAN delivery approach may be easier to integrate into “native” applications (e.g., applications written for iOS or Android), and a proxy server approach may be easier for third party applications that are browser-based, for example.

In certain embodiments, information is provided from a third party application to a local playback system without being routed through or by a controller application. Here, the third party application is communicating with the multimedia playback device (e.g., a Sonos ZonePlayer™). Information can be passed locally, rather than through the Internet, for example. The local playback device accesses the Internet to find content to stream, and the third party application takes the place of the controller application (e.g., throw it over the wall—the application passes information and the local playback system runs it).

Certain embodiments provide an approach similar to the “throw it over the wall” or one way communication approach of FIG. 11 except that the third party application not only tells the local playback system what to play, but also maintains two-way communication with the local playback (e.g., Sonos™) system. Two-way communication helps enable features such as keeping a local playback queue synchronized with a queue that the user is editing/managing in the third party application; allow the third party application to know what is currently playing on the local playback system; allow integrated transport control between the third party application and the local playback system; and so on.

In certain embodiments, a local playback system can pass information back to a third party application to indicate a current point of playback (e.g., now playing a third song in a playlist, fourth song in the playlist, and so on). The local playback system can pass parameter information, such as a change in volume, from a local multimedia playback device to the third party application so the application can reflect the change in volume to the user via its graphical user interface. The third party application can instruct the local playback system to skip a song, go to a certain location, and so on.

Certain embodiments provide a third party mode that allows users to select from any local playback network (e.g., Sonos™) controller to listen to audio from one or more third party applications on their smartphones or tablets (e.g., Android™ devices). For example, a user may be using a local playback network controller application and now wants a third party application to appear as an audio source within the controller application. The user can then select the controller application that he or she wishes to play audio from the third party application, for example.

Certain embodiments provide queue management to allow a third party application to control a local playback queue. That is, the local playback system has a queue, but the third party application allows users to add, delete and so on from the queue, for example. Rather than switch from content that the user is currently playing, the local playback system allows a user to create a playlist on the fly. For example, if last.fm users vote that they do not like a song and it should be skipped, then the local playback system will skip it.

Certain embodiments allow a third party application to override a local playback queue with its own application-specific queue. The local playback system periodically fetches a short list of tracks to play next. The list of tracks to play is determined by the third-party application, for

example. In certain embodiments, a shared queue is provided between the local playback system and the third party application to keep the local system and application synchronized.

Certain embodiments allow control of playback system functions and/or settings via an external (e.g., third party) application. For example, a local playback system can allow volume control, play/pause, and so on and can interact with an application running on a given platform/operating system (OS). Certain embodiments provide a Web API that can be used to access functionality.

Certain embodiments facilitate control of a local playback system from outside a household or other location at which the local playback network is configured. For example, a user can queue up music while away from his or her house. The application can facilitate setup and/or configuration. For example, a third party application may ask the user to enter a Sonos customer email address and password. The application can then make a request to a Sonos server in the cloud to determine the zone groups on which music can be played.

Various inventions have been described in sufficient detail with a certain degree of particularity. It is understood to those skilled in the art that the present disclosure of embodiments has been made by way of examples only and that numerous changes in the arrangement and combination of parts can be resorted without departing from the spirit and scope of the present disclosure as claimed. While the embodiments discussed herein can appear to include some limitations as to the presentation of the information units, in terms of the format and arrangement, the embodiments have applicability well beyond such embodiment, which can be appreciated by those skilled in the art. Accordingly, the scope of the present disclosure is defined by the appended claims rather than the forgoing description of embodiments.

The invention claimed is:

1. A method comprising:

causing, via a control device, a graphical interface to display a control interface including one or more transport controls to control playback by the control device; after connecting to a local area network via a network interface, identifying, via the control device, playback devices connected to the local area network;

causing, via the control device, the graphical interface to display a selectable option for transferring playback from the control device;

detecting, via the control device, a set of inputs to transfer playback from the control device to a particular playback device, wherein the set of inputs comprises: (i) a selection of the selectable option for transferring playback from the control device and (ii) a selection of the particular playback device from the identified playback devices connected to the local area network;

after detecting the set of inputs to transfer playback from the control device to the particular playback device, causing playback to be transferred from the control device to the particular playback device, wherein transferring playback from the control device to the particular playback device comprises:

(a) causing one or more first cloud servers to add multimedia content to a local playback queue on the particular playback device, wherein adding the multimedia content to the local playback queue comprises the one or more first cloud servers adding, to the local playback queue, one or more resource locators corresponding to respective locations of the multimedia content at one or more second cloud servers of a streaming content service;

(b) causing playback at the control device to be stopped; and

(c) modifying the one or more transport controls of the control interface to control playback by the playback device; and

causing the particular playback device to play back the multimedia content, wherein the particular playback device playing back the multimedia content comprises the particular playback device retrieving the multimedia content from one or more second cloud servers of a streaming content service and playing back the retrieved multimedia content.

2. The method of claim 1, wherein detecting the set of inputs to transfer playback from the control device to the particular playback device comprises detecting a set of inputs to transfer playback from the control device to a particular zone of a media playback system that includes the particular playback device as a first channel of a stereo pair and an additional playback device as a second channel of the stereo pair, wherein modifying the one or more transport controls of the control interface to control playback by the particular playback device comprises causing the one or more transport controls of the control interface to control playback by the particular playback device and the additional playback device, and wherein the particular playback device playing back the retrieved multimedia content comprises the particular playback device and the additional playback device playing back the multimedia content as the stereo pair.

3. The method of claim 1, wherein detecting the set of inputs to transfer playback from the control device to the particular playback device comprises detecting a set of inputs to transfer playback from the control device to a particular zone group of a media particular playback system that includes a first zone and a second zone, wherein the first zone includes the particular playback device and the second zone includes at least one additional playback device, wherein modifying the one or more transport controls of the control interface to control playback by the playback device comprises causing the one or more transport controls of the control interface to control playback by the particular playback device and the at least one additional playback device in synchrony, and wherein the particular playback device playing back the retrieved multimedia content comprises the particular playback device and the at least one additional playback device playing back the multimedia content in synchrony.

4. The method of claim 1, wherein the control interface is displayed by an application associated with the streaming content service, and wherein the set of inputs further comprises detecting an input to select a link in the application associated with the streaming content service and wherein selection of the link launches a second application to facilitate retrieving the multimedia content by the particular playback device from a particular source indicated by a resource locator.

5. The method of claim 1, wherein the control interface is displayed by an application associated with the streaming content service, and wherein the set of inputs further comprises detecting an input to select a link in the application associated with the streaming content service and wherein selection of the link causes the control device to transmit information to the one or more first cloud servers to add multimedia content to the local playback queue on the particular playback device.

6. The method of claim 1, further comprising detecting, via the control device, a set of inputs to transfer playback

US 9,967,615 B2

19

from the playback device back to the control device, wherein transferring playback from the playback device back to the control device comprises:

causing playback at the playback device to be stopped; and

modifying the one or more transport controls of the control interface to control playback by the control device.

7. The method of claim 1, wherein causing the graphical interface to display the control interface including one or more transport controls to control playback by the control device comprises causing the graphical interface to display a control interface that includes the one or more transport controls in a particular arrangement on the graphical interface, and wherein modifying the one or more transport controls of the control interface to control playback by the particular playback device comprises causing the graphical interface to display the one or more transport controls to control playback by the particular playback device in the particular arrangement.

8. The method of claim 1, wherein causing the one or more first cloud servers to add multimedia content to the local playback queue comprises causing an identifier of the multimedia content to be added to the local playback queue, wherein the identifier indicates a particular source of the multimedia content at the one or more second cloud servers of the streaming content service, wherein the particular playback device receives the multimedia content from the particular source at the one or more second cloud servers of the streaming content service.

9. The method of claim 1, wherein causing one or more first cloud servers to add the multimedia content to the local playback queue on the particular playback device comprises sending a message to the streaming content service that causes the one or more first cloud servers to add the multimedia content to the local playback queue on the particular playback device.

10. The method of claim 1, wherein detecting the set of inputs comprises detecting a selection of the multimedia content.

11. The method of claim 1, wherein detecting the set of inputs comprises detecting an input that causes playback at the control device to be stopped.

12. The method of claim 1, wherein detecting the set of inputs comprises detecting selection of a button on the control interface.

13. A tangible, non-transitory computer readable storage medium including instructions for execution by a processor, the instructions, when executed, cause a control device to implement a method comprising:

causing a graphical interface to display a control interface including one or more transport controls to control playback by the control device;

after connecting to a local area network via a network interface, identifying playback devices connected to the local area network;

causing the graphical interface to display a selectable option for transferring playback from the control device;

detecting a set of inputs to transfer playback from the control device to a particular playback device, wherein the set of inputs comprises: (i) a selection of the selectable option for transferring playback from the control device and (ii) a selection of the particular playback device from the identified playback devices connected to the local area network;

20

after detecting the set of inputs to transfer playback from the control device to the particular playback device, causing playback to be transferred from the control device to the particular playback device, wherein transferring playback from the control device to the particular playback device comprises:

(a) causing one or more first cloud servers to add multimedia content to a local playback queue on the particular playback device, wherein adding the multimedia content to the local playback queue comprises the one or more first cloud servers adding, to the local playback queue, one or more resource locators corresponding to respective locations of the multimedia content at one or more second cloud servers of a streaming content service;

(b) causing playback at the control device to be stopped; and

(c) modifying the one or more transport controls of the control interface to control playback by the playback device; and

causing the particular playback device to play back the multimedia content, wherein the particular playback device playing back the multimedia content comprises the particular playback device retrieving the multimedia content from one or more second cloud servers of a streaming content service and playing back the retrieved multimedia content.

14. The tangible, non-transitory computer readable medium of claim 13, wherein detecting the set of inputs to transfer playback from the control device to the particular playback device comprises detecting a set of inputs to transfer playback from the control device to a particular zone of a media playback system that includes the particular playback device as a first channel of a stereo pair and an additional playback device as a second channel of the stereo pair, wherein modifying the one or more transport controls of the control interface to control playback by the particular playback device comprises causing the one or more transport controls of the control interface to control playback by the particular playback device and the additional playback device, and wherein the particular playback device playing back the retrieved multimedia content comprises the particular playback device and the additional playback device playing back the multimedia content as the stereo pair.

15. The tangible, non-transitory computer readable medium of claim 13, wherein detecting the set of inputs to transfer playback from the control device to the particular playback device comprises detecting a set of inputs to transfer playback from the control device to a particular zone group of a media particular playback system that includes a first zone and a second zone, wherein the first zone includes the particular playback device and the second zone includes at least one additional playback device, wherein modifying the one or more transport controls of the control interface to control playback by the playback device comprises causing the one or more transport controls of the control interface to control playback by the particular playback device and the at least one additional playback device in synchrony, and wherein the particular playback device playing back the retrieved multimedia content comprises the particular playback device and the at least one additional playback device playing back the multimedia content in synchrony.

16. The tangible, non-transitory computer readable medium of claim 13, wherein the control interface is displayed by an application associated with the streaming content service, and wherein the set of inputs further com-

US 9,967,615 B2

21

prises detecting an input to select a link in the application associated with the streaming content service and wherein selection of the link launches a second application to facilitate retrieving the multimedia content by the particular playback device from a particular source indicated by a resource locator.

17. The tangible, non-transitory computer readable medium of claim 13, wherein the control interface is displayed by an application associated with the streaming content service, and wherein the set of inputs further comprises detecting an input to select a link in the application associated with the streaming content service and wherein selection of the link causes the control device to transmit information to the one or more first cloud servers to add multimedia content to the local playback queue on the particular playback device.

18. The tangible, non-transitory computer readable medium of claim 13, wherein the method further comprises detecting a set of inputs to transfer playback from the playback device back to the control device, wherein transferring playback from the playback device back to the control device comprises:

- causing playback at the playback device to be stopped; and
- modifying the one or more transport controls of the control interface to control playback by the control device.

19. The tangible, non-transitory computer readable medium of claim 13, wherein causing the graphical interface to display the control interface including one or more transport controls to control playback by the control device comprises causing the graphical interface to display a control interface that includes the one or more transport controls in a particular arrangement on the graphical interface, and wherein modifying the one or more transport controls of the control interface to control playback by the playback device comprises causing the graphical interface to display the one or more transport controls to control playback by the playback device in the particular arrangement.

20. The tangible, non-transitory computer readable medium of claim 13, wherein causing the one or more first cloud servers to add multimedia content to the local playback queue on the particular playback device comprises causing an identifier of the multimedia content to be added to the local playback queue, wherein the identifier indicates a particular source of the multimedia content at the one or more second cloud servers of the streaming content service, wherein the particular playback device receives the multimedia content from the particular source at the one or more second cloud servers of the streaming content service.

21. The tangible, non-transitory computer readable medium of claim 13, wherein causing one or more first cloud servers to add the multimedia content to the local playback queue on the particular playback device comprises sending a message to the streaming content service that causes the one or more first cloud servers to add the multimedia content to the local playback queue on the particular playback device.

22. The tangible, non-transitory computer readable medium of claim 13, wherein detecting the set of inputs comprises detecting a selection of the multimedia content.

23. The tangible, non-transitory computer readable medium of claim 13, wherein detecting the set of inputs comprises detecting an input that causes playback at the control device to be stopped.

22

24. The tangible, non-transitory computer readable medium of claim 13, wherein detecting the set of inputs comprises detecting selection of a button on the control interface.

25. A control device comprising:

- a graphical interface;
- a wireless communication interface to communicate with a playback device;
- one or more processors;

tangible non-transitory computer-readable media having instructions encoded therein, wherein the instructions, when executed by the one or more processors, cause the control device to perform functions comprising:

causing the graphical interface to display a control interface including one or more transport controls to control playback by the control device;

after connecting to a local area network via the wireless communication interface, identifying playback devices connected to the local area network;

causing the graphical interface to display a selectable option for transferring playback from the control device;

detecting a set of inputs to transfer playback from the control device to a particular playback device, wherein the set of inputs comprises: (i) a selection of the selectable option for transferring playback from the control device and (ii) a selection of the particular playback device from the identified playback devices connected to the local area network;

after detecting the set of inputs to transfer playback from the control device to the particular playback device, causing playback to be transferred from the control device to the particular playback device, wherein transferring playback from the control device to the particular playback device comprises:

- (a) causing one or more first cloud servers to add multimedia content to a local playback queue on the particular playback device, wherein adding the multimedia content to the local playback queue comprises the one or more first cloud servers adding, to the local playback queue, one or more resource locators corresponding to respective locations of the multimedia content at one or more second cloud servers of a streaming content service;
- (b) causing playback at the control device to be stopped; and
- (c) modifying the one or more transport controls of the control interface to control playback by the playback device; and

causing the particular playback device to play back the multimedia content, wherein the particular playback device playing back the multimedia content comprises the particular playback device retrieving the multimedia content from one or more second cloud servers of a streaming content service and playing back the retrieved multimedia content.

26. The control device of claim 25, wherein detecting the set of inputs to transfer playback from the control device to the particular playback device comprises detecting a set of inputs to transfer playback from the control device to a particular zone group of a media particular playback system that includes a first zone and a second zone, wherein the first zone includes the particular playback device and the second zone includes at least one additional playback device, wherein modifying the one or more transport controls of the

US 9,967,615 B2

23

control interface to control playback by the playback device
comprises causing the one or more transport controls of the
control interface to control playback by the particular play-
back device and the at least one additional playback device
in synchrony, and wherein the particular playback device 5
playing back the retrieved multimedia content comprises the
particular playback device and the at least one additional
playback device playing back the multimedia content in
synchrony.

27. The control device of claim 25, wherein detecting the 10
set of inputs comprises detecting a selection of the multi-
media content.

28. The control device of claim 25, wherein detecting the
set of inputs comprises detecting an input that causes
playback at the control device to be stopped. 15

29. The control device of claim 25, wherein detecting the
set of inputs comprises detecting selection of a button on the
control interface.

* * * * *

24



US010779033B2

(12) **United States Patent**
Coburn, IV et al.

(10) **Patent No.: US 10,779,033 B2**

(45) **Date of Patent: Sep. 15, 2020**

(54) **SYSTEMS AND METHODS FOR
NETWORKED MUSIC PLAYBACK**

(56) **References Cited**

U.S. PATENT DOCUMENTS

(71) Applicant: **SONOS, INC.**, Santa Barbara, CA (US)

5,406,634 A 4/1995 Anderson et al.

5,440,644 A 8/1995 Farinelli et al.

(Continued)

(72) Inventors: **Arthur Coburn, IV**, Lexington, MA
(US); **Joni Rafalski Hoadley**, Santa
Barbara, CA (US)

FOREIGN PATENT DOCUMENTS

(73) Assignee: **Sonos, Inc.**, Santa Barbara, CA (US)

CA 2832542 A1 10/2012

CA 2947275 A1 10/2012

(Continued)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

OTHER PUBLICATIONS

(21) Appl. No.: **16/389,906**

Chinese Patent Office, Second Office Action dated Nov. 13, 2018,
issued in connection with Chinese Application No. 201480042472.
1, 7 pages.

(22) Filed: **Apr. 19, 2019**

(Continued)

(65) **Prior Publication Data**

US 2019/0332349 A1 Oct. 31, 2019

Primary Examiner — Jesse A Elbin

Related U.S. Application Data

(63) Continuation of application No. 15/872,500, filed on
Jan. 16, 2018, now Pat. No. 10,567,831, which is a
(Continued)

(51) **Int. Cl.**

H04N 21/436 (2011.01)

H04N 21/472 (2011.01)

(Continued)

(52) **U.S. Cl.**

CPC **H04N 21/43615** (2013.01); **G06F 3/0481**
(2013.01); **G06F 3/04842** (2013.01);

(Continued)

(58) **Field of Classification Search**

CPC H04R 3/12; H04R 27/00; H04R 2227/003;
H04R 2227/005; H04R 2420/07;

(Continued)

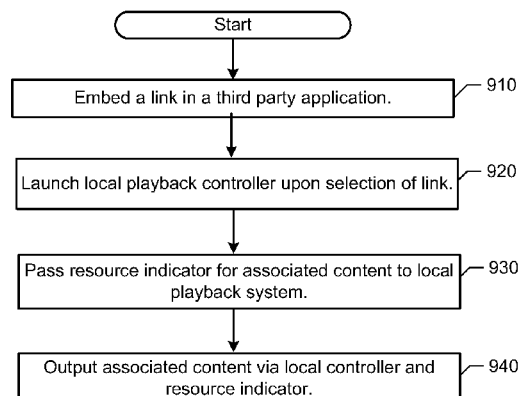
(57)

ABSTRACT

An example computing device in a first mode is configured for playback of given audio content. While in the first mode, the computing device displays a representation of one or more playback devices in a media playback system that are available to accept playback responsibility for the given audio content and receives user input indicating a selection of a given playback device. The computing device transmits an instruction for playback responsibility to be transferred to the given playback device such that i) an identifier of the given audio content and a playback position for the given audio content are provided to the given playback device and ii) the given playback device becomes configured for playback of the given audio content. The computing device transitions from the first mode to a second mode in which the computing device is configured to control the given playback device's playback of the given audio content.

16 Claims, 11 Drawing Sheets

900 ↘



US 10,779,033 B2

Page 2

Related U.S. Application Data

continuation of application No. 14/520,578, filed on Oct. 22, 2014, now Pat. No. 9,883,234, which is a continuation of application No. 13/341,237, filed on Dec. 30, 2011, now Pat. No. 9,654,821.

(51) Int. Cl.

H04N 21/485 (2011.01)
H04N 21/81 (2011.01)
H04N 21/658 (2011.01)
G06F 3/0481 (2013.01)
G06F 3/0484 (2013.01)
G06F 3/16 (2006.01)
G11B 19/02 (2006.01)
H04L 29/06 (2006.01)
H04R 3/12 (2006.01)
H04N 21/439 (2011.01)
H04N 21/61 (2011.01)
H04N 21/643 (2011.01)
H04N 21/6587 (2011.01)
H04N 21/43 (2011.01)
H04N 21/433 (2011.01)
H04N 21/858 (2011.01)

(52) U.S. Cl.

CPC *G06F 3/04847* (2013.01); *G06F 3/165* (2013.01); *G11B 19/025* (2013.01); *H04L 29/06027* (2013.01); *H04L 65/4084* (2013.01); *H04N 21/4307* (2013.01); *H04N 21/439* (2013.01); *H04N 21/4333* (2013.01); *H04N 21/47202* (2013.01); *H04N 21/4852* (2013.01); *H04N 21/6125* (2013.01); *H04N 21/64322* (2013.01); *H04N 21/6581* (2013.01); *H04N 21/6587* (2013.01); *H04N 21/8113* (2013.01); *H04N 21/8586* (2013.01); *H04R 3/12* (2013.01); *G06F 3/04817* (2013.01); *H04R 2227/005* (2013.01); *H04R 2420/07* (2013.01)

(58) Field of Classification Search

CPC *G06F 3/048*; *G06F 3/0481*; *G06F 3/04817*; *G06F 3/0484*; *G06F 3/08442*; *G06F 3/04247*; *G06F 3/165*; *H04L 29/06027*; *H04L 65/4084*; *G11B 19/025*
 USPC 700/94; 715/716, 727, 765, 771
 See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

5,642,171 A 6/1997 Baumgartner et al.
 5,761,320 A 6/1998 Farinelli et al.
 5,856,827 A 1/1999 Sudo
 5,923,902 A 7/1999 Inagaki
 6,002,862 A 12/1999 Takaike
 6,032,202 A 2/2000 Lea et al.
 6,119,239 A 9/2000 Fujii
 6,122,749 A 9/2000 Gulick
 6,181,316 B1 1/2001 Little et al.
 6,255,961 B1 7/2001 Van Ryzin et al.
 6,256,554 B1 7/2001 DiLorenzo
 6,404,811 B1 6/2002 Cvetko et al.
 6,469,633 B1 10/2002 Wachter et al.
 6,522,886 B1 2/2003 Youngs et al.
 6,587,127 B1 7/2003 Leeke et al.
 6,611,537 B1 8/2003 Edens et al.
 6,631,410 B1 10/2003 Kowalski et al.
 6,703,940 B1 3/2004 Allen et al.
 6,721,489 B1 4/2004 Benyamin et al.
 6,728,531 B1 4/2004 Lee et al.
 6,732,155 B2 5/2004 Meek

6,757,517 B2 6/2004 Chang et al.
 6,778,869 B2 8/2004 Champion
 6,826,283 B1 11/2004 Wheeler et al.
 6,832,293 B1 12/2004 Tagawa et al.
 6,910,078 B1 6/2005 Raman et al.
 6,985,694 B1 1/2006 De Bonet et al.
 7,017,118 B1 3/2006 Carroll
 7,020,048 B2 3/2006 McComas
 7,113,833 B1 9/2006 Brown et al.
 7,117,451 B2 10/2006 Sielken
 7,130,608 B2 10/2006 Hollstrom et al.
 7,130,616 B2 10/2006 Janik
 7,143,939 B2 12/2006 Henzerling
 7,178,106 B2 2/2007 Lamkin et al.
 7,187,947 B1 3/2007 White et al.
 7,236,773 B2 6/2007 Thomas
 7,269,338 B2 9/2007 Janevski
 7,295,548 B2 11/2007 Blank et al.
 7,312,785 B2 12/2007 Tsuk et al.
 7,313,384 B1 12/2007 Meenan et al.
 7,358,960 B2 4/2008 Mak
 7,391,791 B2 6/2008 Balassanian et al.
 7,430,181 B1 9/2008 Hong
 7,483,538 B2 1/2009 McCarty et al.
 7,509,181 B2 3/2009 Champion
 7,571,014 B1 8/2009 Lambourne et al.
 7,583,886 B2 9/2009 Komi et al.
 7,630,501 B2 12/2009 Blank et al.
 7,643,894 B2 1/2010 Braithwaite et al.
 7,647,613 B2 1/2010 Drakoulis et al.
 7,657,910 B1 2/2010 McAulay et al.
 7,689,304 B2 3/2010 Sasaki
 7,716,699 B2 5/2010 Evans et al.
 7,725,533 B2 5/2010 Szeto et al.
 7,725,551 B2 5/2010 Szeto et al.
 7,742,740 B2 6/2010 Goldberg et al.
 7,770,314 B2 8/2010 Dean
 7,792,920 B2 9/2010 Istvan et al.
 7,797,446 B2 9/2010 Heller et al.
 7,797,719 B2 9/2010 Drakoulis et al.
 7,805,682 B1 9/2010 Lambourne et al.
 7,827,259 B2 11/2010 Heller et al.
 7,853,341 B2 12/2010 McCarty et al.
 7,895,633 B2 2/2011 Van Hoff et al.
 7,958,441 B2 6/2011 Heller et al.
 7,987,294 B2 7/2011 Bryce et al.
 8,014,423 B2 9/2011 Thaler et al.
 8,045,952 B2 10/2011 Qureshey et al.
 8,050,652 B2 11/2011 Qureshey et al.
 8,055,364 B2 11/2011 Champion
 8,060,407 B1 11/2011 Delker et al.
 8,072,905 B2 12/2011 Haff et al.
 8,074,253 B1 12/2011 Nathan
 8,099,313 B2 1/2012 Messer et al.
 8,103,009 B2 1/2012 McCarty et al.
 8,111,132 B2 2/2012 Allen et al.
 8,131,390 B2 3/2012 Braithwaite et al.
 8,140,974 B2 3/2012 Hayter et al.
 8,148,622 B2 4/2012 Rothkopf et al.
 8,156,435 B2 4/2012 Wohler
 8,204,890 B1 6/2012 Gogan et al.
 8,214,740 B2 7/2012 Johnson
 8,234,395 B2 7/2012 Millington et al.
 8,290,603 B1 10/2012 Lambourne et al.
 8,316,154 B2 11/2012 Yoneda et al.
 8,364,296 B2 1/2013 Wilhelm
 8,407,623 B2 3/2013 Kerr et al.
 8,483,853 B1 7/2013 Lambourne et al.
 8,544,046 B2 9/2013 Gran et al.
 8,588,949 B2 11/2013 Lambourne et al.
 8,601,394 B2 12/2013 Sheehan et al.
 8,688,431 B2 4/2014 Lyons et al.
 8,688,991 B1 4/2014 Sunil
 8,750,677 B2 6/2014 Brown et al.
 8,799,395 B2 8/2014 Seidel et al.
 8,818,538 B2 8/2014 Sakata
 8,843,586 B2 9/2014 Pantos et al.
 8,880,648 B1 11/2014 Arora et al.
 8,942,252 B2 1/2015 Balassanian et al.

US 10,779,033 B2

Page 3

(56)

References Cited

U.S. PATENT DOCUMENTS

8,954,177 B2	2/2015	Sanders	2007/0220150 A1	9/2007	Garg
8,965,544 B2	2/2015	Ramsay	2007/0266065 A1	11/2007	Rosenberg et al.
8,966,394 B2	2/2015	Gates et al.	2007/0288470 A1	12/2007	Kauniskangas et al.
9,137,602 B2	9/2015	Mayman et al.	2008/0005690 A1	1/2008	Van Vugt
9,179,199 B2	11/2015	Alsina et al.	2008/0010372 A1	1/2008	Khedouri et al.
9,195,775 B2	11/2015	Al-Shaykh et al.	2008/0016465 A1	1/2008	Foxenland
9,232,279 B2	1/2016	Beeson et al.	2008/0018625 A1	1/2008	Ijichi et al.
9,241,355 B2	1/2016	Schulert et al.	2008/0025535 A1	1/2008	Rajapakse
9,286,384 B2	3/2016	Kuper et al.	2008/0059567 A1	3/2008	Williams et al.
9,338,206 B2	5/2016	Keum et al.	2008/0085098 A1	4/2008	Ullmann
9,374,607 B2	6/2016	Bates et al.	2008/0086379 A1	4/2008	Dion et al.
9,507,780 B2	11/2016	Rothkopf et al.	2008/0109852 A1	5/2008	Kretz et al.
9,563,703 B2	2/2017	Nijim et al.	2008/0133715 A1	6/2008	Yoneda et al.
9,609,448 B2	3/2017	Bentley et al.	2008/0133763 A1	6/2008	Clark et al.
9,635,068 B2	4/2017	Garmark et al.	2008/0134256 A1	6/2008	DaCosta
9,665,339 B2	5/2017	Reimann et al.	2008/0157991 A1	7/2008	Raghunath et al.
9,735,978 B2	8/2017	Kumar et al.	2008/0162668 A1	7/2008	Miller
9,977,561 B2	5/2018	Bates et al.	2008/0177822 A1	7/2008	Yoneda et al.
2001/0042107 A1	11/2001	Palm	2008/0183840 A1	7/2008	Khedouri et al.
2002/0002039 A1	1/2002	Qureshey et al.	2008/0209487 A1	8/2008	Osann et al.
2002/0022453 A1	2/2002	Balog et al.	2008/0215169 A1	9/2008	Debettencourt et al.
2002/0026442 A1	2/2002	Lipscomb et al.	2008/0221715 A1	9/2008	Krzyzanowski et al.
2002/0124097 A1	9/2002	Isely et al.	2008/0242222 A1	10/2008	Bryce et al.
2002/0165921 A1	11/2002	Sapieyevski	2008/0243278 A1	10/2008	Dalton et al.
2002/0174269 A1	11/2002	Spurgat et al.	2008/0292120 A1	11/2008	Wilson
2002/0178191 A1	11/2002	Sielken	2009/0006542 A1	1/2009	Feldman et al.
2002/0194309 A1	12/2002	Carter et al.	2009/0006968 A1	1/2009	Trask et al.
2003/0023741 A1	1/2003	Tomassetti et al.	2009/0059512 A1	3/2009	Lydon et al.
2003/0079038 A1	4/2003	Robbin et al.	2009/0097818 A1	4/2009	Hirata
2003/0157951 A1	8/2003	Hasty	2009/0099919 A1	4/2009	Schultheiss et al.
2003/0198257 A1	10/2003	Sullivan et al.	2009/0132712 A1	5/2009	P et al.
2003/0210796 A1	11/2003	McCarty et al.	2009/0150491 A1	6/2009	Yamamoto
2004/0024478 A1	2/2004	Hans et al.	2009/0171487 A1	7/2009	Wilhelm et al.
2004/0025185 A1	2/2004	Goci et al.	2009/0172542 A1	7/2009	Girish et al.
2004/0078383 A1	4/2004	Mercer et al.	2009/0197524 A1	8/2009	Haff et al.
2004/0078812 A1	4/2004	Calvert	2009/0222392 A1	9/2009	Martin et al.
2004/0138948 A1	7/2004	Loomis	2009/0228123 A1	9/2009	Fontijn
2004/0215611 A1	10/2004	Jawa et al.	2009/0228919 A1	9/2009	Zott et al.
2004/0261040 A1	12/2004	Radcliffe et al.	2009/0248702 A1	10/2009	Schwartz et al.
2005/0028225 A1	2/2005	Dawson et al.	2009/0249222 A1	10/2009	Schmidt et al.
2005/0108320 A1	5/2005	Lord et al.	2009/0259765 A1	10/2009	Karlsson et al.
2005/0138193 A1	6/2005	Encarnacion et al.	2009/0275285 A1	11/2009	Maricevic et al.
2005/0155072 A1	7/2005	Kaczowka et al.	2010/0005496 A1	1/2010	Ellis et al.
2005/0166157 A1	7/2005	Ollis et al.	2010/0009674 A1	1/2010	Sapkota et al.
2005/0177624 A1	8/2005	Oswald et al.	2010/0027966 A1	2/2010	Harrang et al.
2005/0216855 A1	9/2005	Kopra et al.	2010/0031366 A1	2/2010	Knight et al.
2005/0235334 A1	10/2005	Togashi et al.	2010/0042235 A1	2/2010	Basso et al.
2005/0240494 A1	10/2005	Cue et al.	2010/0082567 A1	4/2010	Rosenblatt et al.
2005/0262253 A1	11/2005	Li et al.	2010/0082725 A1	4/2010	Onishi et al.
2006/0002681 A1	1/2006	Spilo et al.	2010/0082731 A1	4/2010	Haughay et al.
2006/0041577 A1	2/2006	Ellicott et al.	2010/0087214 A1	4/2010	Bournel et al.
2006/0041639 A1	2/2006	Lamkin et al.	2010/0094833 A1	4/2010	Svendsen et al.
2006/0062094 A1	3/2006	Nathan et al.	2010/0095332 A1	4/2010	Gran et al.
2006/0107237 A1	5/2006	Kim	2010/0114979 A1	5/2010	Petersen et al.
2006/0153040 A1	7/2006	Girish et al.	2010/0121891 A1	5/2010	Zampiatello
2006/0156236 A1	7/2006	Heller et al.	2010/0131978 A1	5/2010	Friedlander et al.
2006/0168340 A1	7/2006	Heller et al.	2010/0198767 A1	8/2010	Farrelly
2006/0195480 A1	8/2006	Spiegelman et al.	2010/0206815 A1	8/2010	Garusi et al.
2006/0195521 A1	8/2006	New et al.	2010/0211438 A1	8/2010	Lutnick et al.
2006/0195864 A1	8/2006	New et al.	2010/0250669 A1	9/2010	Pan et al.
2006/0218294 A1	9/2006	Rosenberg	2010/0268360 A1	10/2010	Ingrassia et al.
2006/0253782 A1	11/2006	Stark et al.	2010/0299402 A1	11/2010	Korman et al.
2006/0258289 A1	11/2006	Dua	2010/0299639 A1	11/2010	Ramsay et al.
2006/0263048 A1	11/2006	Sato et al.	2010/0303244 A1	12/2010	Kim et al.
2006/0294201 A1	12/2006	Kito et al.	2010/0306815 A1	12/2010	Emerson et al.
2007/0038999 A1	2/2007	Millington et al.	2010/0318917 A1	12/2010	Holladay et al.
2007/0053514 A1	3/2007	Imai et al.	2010/0332565 A1	12/2010	Al-Shaykh et al.
2007/0061725 A1	3/2007	Isaac et al.	2011/0004330 A1	1/2011	Rothkopf et al.
2007/0067808 A1	3/2007	DaCosta	2011/0047574 A1	2/2011	Tecot et al.
2007/0083897 A1	4/2007	Brownell	2011/0054641 A1	3/2011	Hur et al.
2007/0086724 A1	4/2007	Grady et al.	2011/0055901 A1	3/2011	Karaoguz et al.
2007/0106672 A1	5/2007	Sighart et al.	2011/0060998 A1	3/2011	Schwartz et al.
2007/0106726 A1	5/2007	Rosenberg	2011/0063317 A1	3/2011	Gharaat et al.
2007/0142944 A1	6/2007	Goldberg et al.	2011/0066943 A1	3/2011	Brillon et al.
2007/0169087 A1	7/2007	Fadell	2011/0125809 A1	5/2011	Woods et al.
			2011/0126104 A1	5/2011	Woods et al.
			2011/0131272 A1	6/2011	Littlejohn et al.
			2011/0131518 A1	6/2011	Ohashi et al.
			2011/0131520 A1	6/2011	Al-Shaykh et al.

US 10,779,033 B2

Page 4

(56)

References Cited

U.S. PATENT DOCUMENTS

2011/0173666 A1 7/2011 Yu et al.
 2011/0179455 A1 7/2011 Thompson et al.
 2011/0218656 A1 9/2011 Bishop et al.
 2011/0225496 A1 9/2011 Jaffe et al.
 2011/0231660 A1 9/2011 Kanungo
 2011/0252118 A1 10/2011 Pantos et al.
 2011/0265003 A1 10/2011 Schubert et al.
 2011/0295974 A1 12/2011 Kashaf et al.
 2012/0029672 A1 2/2012 Hamilton et al.
 2012/0038541 A1 2/2012 Song et al.
 2012/0040720 A1 2/2012 Zhang et al.
 2012/0050012 A1 3/2012 Alsina et al.
 2012/0054808 A1 3/2012 Nijim et al.
 2012/0057853 A1 3/2012 Huber et al.
 2012/0088477 A1 4/2012 Cassidy et al.
 2012/0089910 A1 4/2012 Cassidy et al.
 2012/0113964 A1 5/2012 Petersen et al.
 2012/0116883 A1 5/2012 Asam et al.
 2012/0117026 A1 5/2012 Cassidy et al.
 2012/0117193 A1 5/2012 Phillips et al.
 2012/0117586 A1 5/2012 McCoy et al.
 2012/0131125 A1 5/2012 Seidel et al.
 2012/0147825 A1 6/2012 Hassan et al.
 2012/0159372 A1 6/2012 Stallings et al.
 2012/0174204 A1 7/2012 Sturm et al.
 2012/0185770 A1 7/2012 Hwang et al.
 2012/0190398 A1 7/2012 Leukkunen et al.
 2012/0192071 A1 7/2012 Millington
 2012/0202485 A1 8/2012 Mirbaha et al.
 2012/0227076 A1 9/2012 McCoy et al.
 2012/0233067 A1 9/2012 Matthew et al.
 2012/0272062 A1 10/2012 Lee et al.
 2012/0284423 A1 11/2012 Weel et al.
 2012/0304233 A1 11/2012 Roberts et al.
 2012/0311094 A1 12/2012 Biderman et al.
 2012/0311618 A1 12/2012 Blaxland et al.
 2013/0014015 A1 1/2013 Lambourne et al.
 2013/0024018 A1 1/2013 Chang et al.
 2013/0028263 A1 1/2013 Rajapakse et al.
 2013/0047084 A1 2/2013 Sanders et al.
 2013/0054742 A1 2/2013 Tsuji et al.
 2013/0086003 A1 4/2013 Alsina et al.
 2013/0111529 A1 5/2013 Yao et al.
 2013/0117299 A1 5/2013 Kraatz et al.
 2013/0151728 A1 6/2013 Currier et al.
 2013/0157566 A1 6/2013 Oguchi et al.
 2013/0165164 A1 6/2013 Rowe et al.
 2013/0167029 A1 6/2013 Friesen et al.
 2013/0198264 A1 8/2013 Hellman et al.
 2013/0246916 A1 9/2013 Reimann et al.
 2013/0254207 A1 9/2013 Coburn, IV et al.
 2013/0290419 A1 10/2013 Spencer et al.
 2013/0300546 A1 11/2013 Kim et al.
 2013/0326041 A1 12/2013 Bellet et al.
 2013/0346559 A1 12/2013 Van Erven et al.
 2013/0347117 A1 12/2013 Parks et al.
 2014/0006483 A1 1/2014 Garmark et al.
 2014/0006947 A1 1/2014 Garmark et al.
 2014/0052770 A1 2/2014 Gran et al.
 2014/0074959 A1 3/2014 Alsina et al.
 2014/0075308 A1 3/2014 Sanders et al.
 2014/0075314 A1 3/2014 Bachman et al.
 2014/0080479 A1 3/2014 Vangala et al.
 2014/0096166 A1 4/2014 Gordon et al.
 2014/0108929 A1 4/2014 Garmark et al.
 2014/0115462 A1 4/2014 Reznor et al.
 2014/0122589 A1 5/2014 Fyke et al.
 2014/0122737 A1 5/2014 Silberstein et al.
 2014/0123005 A1 5/2014 Forstall et al.
 2014/0140530 A1 5/2014 Gomes-Casseres et al.
 2014/0169569 A1 6/2014 Toivanen et al.
 2014/0181655 A1* 6/2014 Kumar G06F 3/0488
 2014/0195587 A1 7/2014 Sukoff et al.
 2014/0195925 A1 7/2014 Wikander et al.

2014/0215009 A1 7/2014 Zhang et al.
 2014/0229959 A1 8/2014 Beckhardt et al.
 2014/0277651 A1 9/2014 Gomes-Casseres et al.
 2014/0282882 A1 9/2014 Tsui et al.
 2014/0378056 A1 12/2014 Liu et al.
 2015/0026613 A1 1/2015 Kwon et al.
 2015/0074527 A1 3/2015 Sevigny et al.
 2015/0074528 A1 3/2015 Sakalowsky et al.
 2015/0256954 A1 9/2015 Carlsson et al.
 2015/0286360 A1 10/2015 Wachter et al.
 2015/0296268 A1 10/2015 Lee et al.
 2015/0304476 A1 10/2015 Katada et al.
 2016/0048485 A1 2/2016 Sherwood et al.
 2017/0068507 A1* 3/2017 Kim G06F 3/04817
 2017/0251314 A1* 8/2017 Pye, Jr. G06F 3/04817
 2017/0293688 A1 10/2017 Kumar et al.
 2018/0088901 A1* 3/2018 Drinkwater G06F 3/165
 2018/0121158 A1* 5/2018 Hinokio G06F 3/04817

FOREIGN PATENT DOCUMENTS

CN 1684423 A 10/2005
 CN 1906604 A 1/2007
 CN 101009127 A 8/2007
 CN 101212823 A 7/2008
 CN 101222493 A 7/2008
 CN 101268473 A 9/2008
 CN 101410773 A 4/2009
 CN 101595711 A 12/2009
 CN 102098538 A 6/2011
 CN 102171687 A 8/2011
 CN 102281294 A 12/2011
 EP 1389853 A1 2/2004
 EP 2023578 A1 2/2009
 JP 2007060123 A 3/2007
 JP 2007512718 A 5/2007
 JP 2007199220 A 8/2007
 JP 2008027537 A 2/2008
 JP 2009044410 2/2009
 JP 2010067097 A 3/2010
 JP 2010510696 4/2010
 JP 4752793 B2 8/2011
 JP 4929520 B2 5/2012
 JP 2012248199 A 12/2012
 JP 2013101631 A 5/2013
 KR 20090017795 2/2009
 WO 9709756 A2 3/1997
 WO 200153994 7/2001
 WO 2003093950 A2 11/2003
 WO 2005013047 A2 2/2005
 WO 2006101635 A3 12/2007
 WO 2008047184 A1 4/2008
 WO 2009086599 A1 7/2009
 WO 2011049497 A1 4/2011
 WO 2013049346 A1 4/2013
 WO 2013055661 A1 4/2013
 WO 2013101727 7/2013
 WO 2014149533 A2 9/2014
 WO 2014172462 A1 10/2014

OTHER PUBLICATIONS

Chinese Patent Office, Second Office Action dated Oct. 18, 2018, issued in connection with Chinese Application No. 201480034098. 0, 7 pages.
 Chinese Patent Office, Second Office Action dated Nov. 28, 2018, issued in connection with Chinese Application No. 201480033788. 4, 8 pages.
 Chinese Patent Office, Second Office Action dated Nov. 28, 2018, issued in connection with Chinese Application No. 201480034088. 7, 9 pages.
 Chinese Patent Office, Third Office Action dated Mar. 12, 2019, issued in connection with Chinese Application No. 201480034088. 7, 7 pages.
 Corrected Notice of Allowance dated Oct. 6, 2016, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 9 pages.

US 10,779,033 B2

Page 5

(56)

References Cited

OTHER PUBLICATIONS

Dell, Inc. "Dell Digital Audio Receiver: Reference Guide," Jun. 2000, 70 pages.

Dell, Inc. "Start Here," Jun. 2000, 2 pages.

"Denon 2003-2004 Product Catalog," Denon, 2003-2004, 44 pages.

European Patent Office, European Extended Search Report dated Aug. 16, 2017, issued in connection with EP Application No. 16160758.5, 9 pages.

European Patent Office, European Office Action dated Aug. 10, 2018, issued in connection with European Application No. 16160758.5, 4 pages.

European Patent Office, European Office Action dated Nov. 14, 2017, issued in connection with EP Application No. 14803651.0, 4 pages.

European Patent Office, European Office Action dated Oct. 6, 2017, issued in connection with EP Application No. 14784965.7, 5 pages.

European Patent Office, Exam Report dated Apr. 28, 2016, issued in connection with European Patent Application No. 12861517.6, 6 pages.

European Patent Office, Extended European Search Report dated Aug. 1, 2016, issued in connection with European patent application No. 16160758.5, 11 pages.

European Patent Office, Extended European Search Report dated Jun. 7, 2016, issued in connection with European patent application No. 14803651.0, 10 pages.

European Patent Office, Extended European Search Report dated Jun. 9, 2015, issued in connection with European patent application No. 12861517.6, 11 pages.

European Patent Office, Extended European Search Report dated Sep. 9, 2016, issued in connection with European patent application No. 14785247.9, 10 pages.

European Patent Office, Office Action dated Apr. 7, 2017, issued in connection with European Application No. 14803651.0, 4 pages.

European Patent Office, Office Action dated May 11, 2017, issued in connection with European Application No. 14785247.9, 9 pages.

European Patent Office, Summons to Attend Oral Proceedings mailed on Dec. 1, 2016, issued in connection with European Application No. 12861517.6-1905, 11 pages.

Final Office Action dated Jun. 2, 2016, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 12 pages.

Final Office Action dated Aug. 6, 2013, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 14 pages.

Final Office Action dated Dec. 7, 2015, issued in connection with U.S. Appl. No. 13/864,075, filed Apr. 16, 2013, 16 pages.

Final Office Action dated Feb. 7, 2017, issued in connection with U.S. Appl. No. 14/628,952, filed Feb. 23, 2015, 15 pages.

Japanese Patent Office, Office Action dated Jan. 10, 2017, issued in connection with Japanese Patent Application No. 2016-509046, 7 pages.

Final Office Action dated Jul. 8, 2015, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 8 pages.

Final Office Action dated Mar. 10, 2016, issued in connection with U.S. Appl. No. 13/904,932, filed May 29, 2013, 16 pages.

Final Office Action dated Apr. 14, 2014, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 12 pages.

Final Office Action dated Dec. 15, 2017, issued in connection with U.S. Appl. No. 13/904,909, filed May 29, 2013, 12 pages.

Final Office Action dated May 15, 2017, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 12 pages.

Final Office Action dated Mar. 18, 2019, issued in connection with U.S. Appl. No. 14/956,640, filed Dec. 2, 2015, 12 pages.

Final Office Action dated May 19, 2016, issued in connection with U.S. Appl. No. 14/520,578, filed Oct. 22, 2014, 12 pages.

Final Office Action dated Jan. 20, 2016, issued in connection with U.S. Appl. No. 14/628,952, filed Feb. 23, 2015, 10 pages.

Final Office Action dated Sep. 20, 2017, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 22 pages.

Final Office Action dated Mar. 21, 2016, issued in connection with U.S. Appl. No. 13/904,896, filed May 29, 2013, 19 pages.

Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 13/904,923, filed May 29, 2013, 19 pages.

Final Office Action dated Apr. 22, 2015, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 11 pages.

Final Office Action dated Jun. 23, 2015, issued in connection with U.S. Appl. No. 13/904,896, filed May 29, 2013, 16 pages.

Final Office Action dated Oct. 23, 2015, issued in connection with U.S. Appl. No. 13/904,944, filed May 29, 2013, 13 pages.

Final Office Action dated Aug. 24, 2016, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 12 pages.

Final Office Action dated Aug. 25, 2015, issued in connection with U.S. Appl. No. 13/864,081, filed Apr. 16, 2013, 15 pages.

Final Office Action dated Sep. 25, 2015, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 14 pages.

Final Office Action dated Aug. 28, 2015, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 10 pages.

Final Office Action dated Aug. 29, 2016, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 21 pages.

Final Office Action dated Jan. 7, 2019, issued in connection with U.S. Appl. No. 15/872,500, filed Jan. 16, 2018, 7 pages.

Final Office Action dated Feb. 8, 2019, issued in connection with U.S. Appl. No. 13/904,909, filed May 29, 2013, 16 pages.

First Action Interview Office Action dated Jun. 20, 2016, issued in connection with U.S. Appl. No. 14/520,578, filed Oct. 22, 2014, 5 pages.

International Bureau, International Preliminary Report on Patentability, dated Jul. 10, 2014, issued in connection with International Application No. PCT/US2012/071212, filed Dec. 21, 2012, 8 pages.

International Bureau, International Preliminary Report on Patentability dated Feb. 8, 2018, issued in connection with International Application No. PCT/US2016/043840, filed Jul. 25, 2016, 10 pages.

International Bureau, International Preliminary Report on Patentability, dated Oct. 29, 2015, issued in connection with International Application No. PCT/US2014/034290, filed Apr. 16, 2014, 7 pages.

International Bureau, International Preliminary Report on Patentability, dated Oct. 29, 2015, issued in connection with International Application No. PCT/US2014/034372, filed Apr. 16, 2014, 8 pages.

International Bureau, International Preliminary Report on Patentability, dated Oct. 29, 2015, issued in connection with International Application No. PCT/US2014/034292, filed Apr. 16, 2014, 6 pages.

International Searching Authority, International Report on Patentability dated Dec. 10, 2015, issued in connection with International Application No. PCT/US2014/039669, filed May 28, 2014, 6 pages.

International Searching Authority, International Search Report dated Aug. 14, 2014, issued in connection with International Application No. PCT/US2014/034292, 3 pages.

International Searching Authority, International Search Report dated Aug. 20, 2014, issued in connection with International Application No. PCT/US2014/034372, filed Apr. 16, 2014, 3 pages.

International Searching Authority, International Search Report dated Aug. 21, 2014, issued in connection with International Application No. PCT/US2014/034290, filed Apr. 16, 2014, 3 pages.

International Searching Authority, International Search Report dated Sep. 22, 2014, issued in connection with International Application No. PCT/US2014/039669, filed May 28, 2014, 3 pages.

International Searching Authority, Written Opinion dated Aug. 14, 2014, issued in connection with International Application No. PCT/US2014/034292, filed Apr. 16, 2014, 4 pages.

International Searching Authority, Written Opinion dated Aug. 20, 2014, issued in connection with International Application No. PCT/US2014/034372, filed Apr. 16, 2014, 6 pages.

International Searching Authority, Written Opinion dated Aug. 21, 2014, issued in connection with International Application No. PCT/US2014/034290, filed Apr. 16, 2014, 5 pages.

International Searching Authority, Written Opinion dated Sep. 22, 2014, issued in connection with International Application No. PCT/US2014/039669, filed May 28, 2014, 5 pages.

Japanese Patent Office, Final Office Action dated Sep. 19, 2017, issued in connection with Japanese Patent Application No. 2016-509047, 1 page.

Japanese Patent Office, Japanese Office Action dated Jul. 12, 2016, issued in connection with Japanese Application No. 2014-550400, 10 pages.

US 10,779,033 B2

Page 6

(56)

References Cited

OTHER PUBLICATIONS

Japanese Patent Office, Japanese Office Action dated Oct. 20, 2015, issued in connection with Japanese Application No. 2014-550400, 8 pages.

Japanese Patent Office, Non-Final Office Action dated Mar. 28, 2017, issued in connection with Japanese Patent Application No. 2016-516750, 5 pages.

Japanese Patent Office, Notice of Rejection dated Dec. 20, 2016, issued in connection with Japanese Application No. 2016-509069, 6 pages.

Notice of Allowance dated Nov. 16, 2018, issued in connection with U.S. Appl. No. 15/626,793, filed Jun. 19, 2017, 13 pages.

Notice of Allowance dated Aug. 17, 2017, issued in connection with U.S. Appl. No. 13/904,923, filed May 29, 2013, 23 pages.

Notice of Allowance dated Nov. 17, 2016, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 12 pages.

Notice of Allowance dated Oct. 17, 2017, issued in connection with U.S. Appl. No. 14/520,578, filed Oct. 22, 2014, 8 pages.

Notice of Allowance dated Sep. 20, 2016, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 12 pages.

Notice of Allowance dated Aug. 21, 2017, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 7 pages.

Notice of Allowance dated Nov. 21, 2018, issued in connection with U.S. Appl. No. 16/107,025, filed Aug. 21, 2018, 14 pages.

Notice of Allowance dated Dec. 22, 2017, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 10 pages.

Notice of Allowance dated Nov. 23, 2016, issued in connection with U.S. Appl. No. 13/904,896, filed May 29, 2013, 18 pages.

Notice of Allowance dated Nov. 23, 2016, issued in connection with U.S. Appl. No. 13/904,932, filed May 29, 2013, 5 pages.

Notice of Allowance dated Jan. 25, 2017, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 7 pages.

Notice of Allowance dated Feb. 26, 2016, issued in connection with U.S. Appl. No. 13/864,081, filed Apr. 16, 2013, 13 pages.

Notice of Allowance dated Feb. 26, 2019, issued in connection with U.S. Appl. No. 15/263,628, filed Sep. 13, 2016, 11 pages.

Notice of Allowance dated Jun. 28, 2017, issued in connection with U.S. Appl. No. 13/904,896, filed May 29, 2013, 17 pages.

Notice of Allowance dated Jun. 28, 2019, issued in connection with U.S. Appl. No. 14/956,640, filed Dec. 2, 2015, 8 pages.

Notice of Allowance dated Apr. 3, 2019, issued in connection with U.S. Appl. No. 15/135,423, filed Apr. 21, 2016, 9 pages.

Notice of Allowance dated Oct. 3, 2018, issued in connection with U.S. Appl. No. 16/107,053, filed Aug. 21, 2018, 17 pages.

Notice of Allowance dated Oct. 30, 2017, issued in connection with U.S. Appl. No. 14/628,952, filed Feb. 23, 2015, 8 pages.

Notice of Allowance dated Aug. 31, 2016, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 7 pages.

Notice of Allowance dated Apr. 4, 2017, issued in connection with U.S. Appl. No. 13/904,932, filed May 29, 2013, 5 pages.

Notice of Allowance dated Jan. 7, 2019, issued in connection with U.S. Appl. No. 16/107,092, filed Aug. 21, 2018, 13 pages.

Notification of Reopening of Prosecution Due to Consideration of an Information Disclosure Statement Filed After Mailing of a Notice Allowance dated Jan. 20, 2017, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 2 pages.

"Sonos Multi-Room Music System User Guide," Version 090401, Sonos, Inc. Apr. 1, 2009, 256 pages.

"Sonos Wireless Dock Product Guide," Version 100101, Sonos, Inc. Oct. 10, 2001, 196 pages.

"Sonos™ Digital Music System User Guide", Version: 070101, Sonos, Inc., Jan. 2007, 179 pages.

Palm, Inc., "Handbook for the Palm VII Handheld," May 2000, 311 pages.

Pre-Interview First Office Action dated Dec. 22, 2015, issued in connection with U.S. Appl. No. 14/520,578, filed Oct. 22, 2014, 9 pages.

Presentations at WinHEC 2000, May 2000, 138 pages.

PRISMIQ, Inc., "PRISMIQ Media Player User Guide," 2003, 44 pages.

Ritchie et al., "UPnP AV Architecture:2 for UPnP Version 1.0", 2010, XP055032201, retrieved from the internet: URL:http://upnp.org/specs/av/UPnP-av_AVArchitecture-v2.pdf, 35 pages.

Supplemental Notice of Allowability dated Nov. 4, 2015, issued in connection with U.S. Appl. No. 13/864,086, filed Apr. 16, 2013, 2 pages.

Supplemental Notice of Allowance dated Dec. 21, 2016, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 2 pages.

U.S. Appl. No. 60/490,768, filed Jul. 28, 2003, entitled "Method for synchronizing audio playback between multiple networked devices," 13 pages.

U.S. Appl. No. 60/825,407, filed Sep. 12, 2006, entitled "Controlling and manipulating groupings in a multi-zone music or media system," 82 pages.

UPnP; "Universal Plug and Play Device Architecture," Jun. 8, 2000; version 1.0; Microsoft Corporation; pp. 1-54.

"Welcome. You're watching Apple TV." Apple TV 1st Generation Setup Guide, Apr. 8, 2008 Retrieved Oct. 14, 2014, 40 pages.

"Welcome. You're watching Apple TV." Apple TV 2nd Generation Setup Guide, Mar. 10, 2011 Retrieved Oct. 16, 2014, 36 pages.

"Welcome. You're watching Apple TV." Apple TV 3rd Generation Setup Guide, Mar. 16, 2012 Retrieved Oct. 16, 2014, 36 pages.

Yamaha DME 64 Owner's Manual; copyright 2004, 80 pages.

Yamaha DME Designer 3.5 setup manual guide; copyright 2004, 16 pages.

Yamaha DME Designer 3.5 User Manual; Copyright 2004, 507 pages.

Bluetooth. "Specification of the Bluetooth System: The ad hoc SCATTERNET for affordable and highly functional wireless connectivity," Core, Version 1.0 A, Jul. 26, 1999, 1068 pages.

Bluetooth. "Specification of the Bluetooth System: Wireless connections made easy," Core, Version 1.0 B, Dec. 1, 1999, 1076 pages.

Advisory Action dated Dec. 2, 2015, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 4 pages.

Advisory Action dated Dec. 5, 2016, issued in connection with U.S. Appl. No. 13/904,923, filed May 29, 2013, 5 pages.

Advisory Action dated May 1, 2019, issued in connection with U.S. Appl. No. 13/904,909, filed May 29, 2013, 3 pages.

Advisory Action dated Mar. 13, 2018, issued in connection with U.S. Appl. No. 13/904,909, filed May 29, 2013, 3 pages.

Advisory Action dated Apr. 14, 2017, issued in connection with U.S. Appl. No. 14/628,952, filed Feb. 23, 2015, 3 pages.

Advisory Action dated Dec. 16, 2015, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 11 pages.

Advisory Action dated Jun. 16, 2016, issued in connection with U.S. Appl. No. 13/904,896, filed May 29, 2013, 5 pages.

Advisory Action dated Oct. 16, 2013, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 5 pages.

Advisory Action dated Sep. 17, 2015, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 4 pages.

Advisory Action dated Feb. 25, 2016, issued in connection with U.S. Appl. No. 13/904,944, filed May 29, 2013, 4 pages.

Advisory Action dated Apr. 29, 2016, issued in connection with U.S. Appl. No. 13/864,075, filed Apr. 16, 2013, 3 pages.

Advisory Action dated Oct. 29, 2015, issued in connection with U.S. Appl. No. 13/864,081, filed Apr. 16, 2013, 3 pages.

Anonymous, "Sonos Controller for Mac or PC Product Guide", Retrieved from the Internet, XP055254086, 2013, 108 pages.

AudioTron Quick Start Guide, Version 1.0, Mar. 2001, 24 pages.

AudioTron Reference Manual, Version 3.0, May 2002, 70 pages.

AudioTron Setup Guide, Version 3.0, May 2002, 38 pages.

Australian Intellectual Property Office, Patent Examination Report No. 1 dated Jan. 16, 2015, issued in connection with Australian Patent Application No. 2012362573, 3 pages.

Australian Patent Office, Examination Report dated Mar. 22, 2017, issued in connection with Australian Application No. 2016202175, 3 pages.

European Patent Office, Extended European Search Report dated Nov. 21, 2016, issued in connection with European Application No. 14784965.7-1870, 6 pages.

US 10,779,033 B2

Page 7

(56)

References Cited

OTHER PUBLICATIONS

European Patent Office, Extended European Search Report dated Oct. 18, 2016, issued in connection with European patent application No. 14785806.2, 9 pages.

Canadian Patent Office, Canadian Office Action dated Nov. 3, 2016, issued in connection with Canadian Application No. 2,861,790, 4 pages.

Canadian Patent Office, Canadian Office Action dated Nov. 12, 2015, issued in connection with Canadian Application No. 2,861,790, 3 pages.

Canadian Patent Office, Canadian Office Action dated Nov. 22, 2017, issued in connection with CA Application No. 2861790, 4 pages.

Canadian Patent Office, Office Action dated Sep. 13, 2018, issued in connection with Canadian Application No. 2861790, 4 pages.

Chen et al., "What a Juke! A Collaborative Music Sharing System," World of Wireless, Mobile and Multimedia Networks (WOWMOM), 2012 IEEE International Symposium, 2012, 6 pages.

Chinese Patent Office, Chinese Office Action dated Jan. 5, 2017, issued in connection with Chinese Application No. 201280069674.6, 14 pages.

Chinese Patent Office, First Office Action dated Mar. 5, 2018, issued in connection with Chinese Application No. 2014800424721, 10 pages.

Chinese Patent Office, First Office Action dated Feb. 2, 2018, issued in connection with Chinese Application No. 2014800340980, 11 pages.

Chinese Patent Office, First Office Action dated Jan. 2, 2018, issued in connection with Chinese Application No. 201480033788.4, 16 pages.

Chinese Patent Office, First Office Action dated Jan. 4, 2018, issued in connection with Chinese Application No. 201480034088.7, 15 pages.

Japanese Patent Office, Office Action dated Feb. 14, 2017, issued in connection with Japanese Patent Application No. 2016-509047, 9 pages.

Jo et al., "Synchronized One-to-many Media Streaming with Adaptive Playout Control," Proceedings of SPIE, 2002, pp. 71-82, vol. 4861.

Jones, Stephen, "Dell Digital Audio Receiver: Digital upgrade for your analog stereo," Analog Stereo, Jun. 24, 2000 retrieved Jun. 18, 2014, 2 pages.

Louderback, Jim, "Affordable Audio Receiver Furnishes Homes With MP3," TechTV Vault. Jun. 28, 2000 retrieved Jul. 10, 2014, 2 pages.

Mate et al., "Movable-Multimedia: Session Mobility in Ubiquitous Computing Ecosystem", XP055019030, 2006, 6 pages.

Motorola, "Simplefi, Wireless Digital Audio Receiver, Installation and User Guide," Dec. 31, 2001, 111 pages.

Non-Final Office Action dated Feb. 23, 2017, issued in connection with U.S. Appl. No. 13/904,923, filed May 29, 2013, 21 pages.

Non-Final Office Action dated Feb. 2, 2016, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 14 pages.

Non-Final Office Action dated Mar. 2, 2015, issued in connection with U.S. Appl. No. 13/904,896, filed May 29, 2013, 15 pages.

Non-Final Office Action dated Feb. 7, 2017, issued in connection with U.S. Appl. No. 14/520,578, filed Oct. 22, 2014, 5 pages.

Non-Final Office Action dated Oct. 8, 2014, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 12 pages.

Non-Final Office Action dated Mar. 9, 2017, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 20 pages.

Non-Final Office Action dated May 9, 2017, issued in connection with U.S. Appl. No. 14/628,952, filed Feb. 23, 2015, 12 pages.

Non-Final Office Action dated Mar. 10, 2015, issued in connection with U.S. Appl. No. 13/864,081, filed Apr. 16, 2013, 13 pages.

Non-Final Office Action dated Aug. 12, 2016, issued in connection with U.S. Appl. No. 13/904,909, filed May 29, 2013, 21 pages.

Non-Final Office Action dated Feb. 13, 2015, issued in connection with U.S. Appl. No. 13/904,936, filed May 29, 2013, 10 pages.

Non-Final Office Action dated Mar. 13, 2015, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 20 pages.

Non-Final Office Action dated Dec. 14, 2016, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 5 pages.

Non-Final Office Action dated Jun. 16, 2016, issued in connection with U.S. Appl. No. 13/904,932, filed May 29, 2013, 15 pages.

Non-Final Office Action dated Oct. 16, 2018, issued in connection with U.S. Appl. No. 15/263,628, filed Sep. 13, 2016, 7 pages.

Non-Final Office Action dated Apr. 17, 2018, issued in connection with U.S. Appl. No. 14/956,640, filed Dec. 2, 2015, 15 pages.

Non-Final Office Action dated Mar. 17, 2016, issued in connection with U.S. Appl. No. 13/904,923, filed May 29, 2013, 15 pages.

Non-Final Office Action dated Oct. 17, 2018, issued in connection with U.S. Appl. No. 15/135,423, filed Apr. 21, 2016, 13 pages.

Non-Final Office Action dated Nov. 18, 2015, issued in connection with U.S. Appl. No. 13/904,896, filed May 29, 2013, 18 pages.

Non-Final Office Action dated Nov. 18, 2015, issued in connection with U.S. Appl. No. 13/904,932, filed May 29, 2013, 12 pages.

Non-Final Office Action dated Aug. 19, 2015, issued in connection with U.S. Appl. No. 13/864,075, filed Apr. 16, 2013, 18 pages.

Non-Final Office Action dated Jan. 19, 2016, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 10 pages.

Non-Final Office Action dated Apr. 20, 2018, issued in connection with U.S. Appl. No. 15/872,500, filed Jan. 16, 2018, 7 pages.

Non-Final Office Action dated Feb. 22, 2017, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 14 pages.

Non-Final Office Action dated Apr. 23, 2015, issued in connection with U.S. Appl. No. 13/904,944, filed May 29, 2013, 12 pages.

Non-final Office Action dated Mar. 24, 2015, issued in connection with U.S. Appl. No. 13/864,086, filed Apr. 16, 2013, 14 pages.

Non-Final Office Action dated Jan. 25, 2013, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 9 pages.

Non-Final Office Action dated Jul. 25, 2016, issued in connection with U.S. Appl. No. 14/628,952, filed Feb. 23, 2015, 12 pages.

Non-Final Office Action dated Mar. 25, 2016, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 13 pages.

Non-Final Office Action dated Jul. 26, 2017, issued in connection with U.S. Appl. No. 14/520,578, filed Oct. 22, 2014, 10 pages.

Non-Final Office Action dated Nov. 26, 2013, issued in connection with U.S. Appl. No. 13/341,237, filed Dec. 30, 2011, 15 pages.

Non-Final Office Action dated Dec. 28, 2015, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 10 pages.

Non-Final Office Action dated May 28, 2015, issued in connection with U.S. Appl. No. 14/628,952, filed Feb. 23, 2015, 9 pages.

Non-Final Office Action dated Jun. 29, 2018, issued in connection with U.S. Appl. No. 13/904,909, filed May 29, 2013, 18 pages.

Non-Final Office Action dated Jun. 3, 2019, issued in connection with U.S. Appl. No. 13/904,909, filed May 29, 2013, 16 pages.

Non-Final Office Action dated Dec. 30, 2014, issued in connection with U.S. Appl. No. 14/520,566, filed Oct. 22, 2014, 10 pages.

Non-Final Office Action dated Oct. 30, 2018, issued in connection with U.S. Appl. No. 14/956,640, filed Dec. 2, 2015, 11 pages.

Non-Final Office Action dated Mar. 7, 2019, issued in connection with U.S. Appl. No. 15/872,500, filed Jan. 16, 2018, 12 pages.

Notice of Allowance dated Oct. 9, 2015, issued in connection with U.S. Appl. No. 13/864,086, filed Apr. 16, 2013, 14 pages.

Notice of Allowance dated Jun. 6, 2016, issued in connection with U.S. Appl. No. 13/904,944, filed May 29, 2013, 5 pages.

Notice of Allowance dated Nov. 7, 2016, issued in connection with U.S. Appl. No. 14/520,578, filed Oct. 22, 2014, 14 pages.

Notice of Allowance dated Mar. 9, 2017, issued in connection with U.S. Appl. No. 13/904,949, filed May 29, 2013, 13 pages.

Notice of Allowance dated Jun. 13, 2016, issued in connection with U.S. Appl. No. 13/864,075, filed Apr. 16, 2013, 11 pages.

Notice of Allowance dated May 16, 2018, issued in connection with U.S. Appl. No. 15/263,069, filed Sep. 12, 2016, 5 pages.

Notice of Allowance dated Oct. 28, 2019, issued in connection with U.S. Appl. No. 16/551,070, filed Aug. 26, 2019, 8 pages.

Sonos, Inc. v. Lenbrook Industries Limited et al., Defendants' First Amended Answer and Counterclaims to Plaintiff's Complaint, filed Nov. 14, 2019, 66 pages.

US 10,779,033 B2

Page 8

(56)

References Cited

OTHER PUBLICATIONS

Australian Patent Office, Australian Examination Report Action dated Jul. 3, 2019, issued in connection with Australian Application No. 2018203185, 3 pages.

European Patent Office, European Search Report dated Jul. 22, 2019, issued in connection with European Application No. 19178151.7, 7 pages.

European Patent Office, Summons to Attend Oral Proceedings mailed on Jul. 12, 2019, issued in connection with European Application No. 14785247.9, 12 pages.

Notice of Allowance dated Sep. 20, 2019, issued in connection with U.S. Appl. No. 15/872,500, filed Jan. 16, 2018, 7 pages.

Sonos, Inc. v. Implicit, LLC: Declaration of Roman Chertov in Support of the Inter Partes Review of U.S. Pat. No. 7,391,791 dated Mar. 9, 2018, 92 pages.

Sonos, Inc. v. Implicit, LLC: Declaration of Roman Chertov in Support of the Inter Partes Review of U.S. Pat. No. 8,942,252 dated Mar. 9, 2018, 81 pages.

Sonos, Inc. v. Lenbrook Industries Limited et al., Defendants' Answer to Plaintiff's Complaint—Exhibit A, filed Oct. 14, 2019, 3 pages.

Sonos, Inc. v. Lenbrook Industries Limited et al., Defendants' Answer to Plaintiff's Complaint—Exhibit C, filed Oct. 14, 2019, 16 pages.

Sofas, Inc. v. Lenbrook Industries Limited et al., Defendants' Answer to Plaintiff's Complaint—Exhibit D, filed Oct. 14, 2019, 36 pages.

Sonos, Inc. v. Lenbrook Industries Limited et al., Defendants' Answer to Plaintiff's Complaint—Exhibit E, filed Oct. 14, 2019, 21 pages.

Sonos, Inc. v. Lenbrook Industries Limited et al., Defendants' Answer to Plaintiff's Complaint, filed Oct. 14, 2019, 66 pages.

Chinese Patent Office, First Office Action and Translation dated Nov. 25, 2019, issued in connection with Chinese Application No. 201810042292.3, 13 pages.

Final Office Action dated Dec. 12, 2019, issued in connection with U.S. Appl. No. 13/904,909, filed May 29, 2013, 21 pages.

Notice of Allowance dated Dec. 16, 2019, issued in connection with U.S. Appl. No. 15/872,500, filed Jan. 16, 2018, 7 pages.

Australian Patent Office, Australian Examination Report Action dated Jan. 31, 2020, issued in connection with Australian Application No. 2018203185, 4 pages.

Barix Download Exstreamer Software. Accessed via WayBack Machine, Apr. 6, 2003. <http://www.barix.com/exstreamer/software.download.html>. 2 pages.

Barix. Exstreamer Datasheet. Accessed via WayBack Machine, Apr. 2, 2003. <http://www.barix.com/exstreamer/>, 1 page.

Canadian Patent Office, Canadian Office Action dated Dec. 10, 2019, issued in connection with Canadian Application No. 2861790, 5 pages.

European Patent Office, Decision to Refuse European Patent Application dated Dec. 20, 2019, issued in connection with European Application No. 14785247.9, 25 pages.

European Patent Office, European Extended Search Report dated May 7, 2020, issued in connection with European Application No. 20159841.4, 16 pages.

European Patent Office, European Office Action dated May 25, 2020, issued in connection with European Application No. 19178151.7, 4 pages.

Exstreamer. Network MP3 player for digital audio streaming in a consumer, home installation and commercial applications. Barix Think Further. Sep. 2002, 2 pages.

Exstreamer. The Exstreamer Instruction Manual. Barix Think Further. Version 1.5, Oct. 2002, 21 pages.

Exstreamer. The Exstreamer Technical Description: Version 1.5. Barix Think Further. Oct. 2002, 36 pages.

Non-Final Office Action dated Dec. 26, 2019, issued in connection with U.S. Appl. No. 16/550,148, filed on Aug. 23, 2019, 20 pages.

Notice of Allowance dated May 21, 2020, issued in connection with U.S. Appl. No. 16/550,148, filed on Aug. 23, 2019, 7 pages.

Notice of Allowance dated Mar. 3, 2020, issued in connection with U.S. Appl. No. 13/904,909, filed on May 29, 2013, 11 pages.

Yahoo Groups. Exstreamer. Barix Exstreamer. Access via Wayback Machine <http://groups.yahoo.com/group/exstreamer/> Dec. 22, 2013, 1 page.

Yamaha DME Designer 3.0 Owner's Manual; Copyright 2008, 501 pages.

* cited by examiner

U.S. Patent

Sep. 15, 2020

Sheet 1 of 11

US 10,779,033 B2

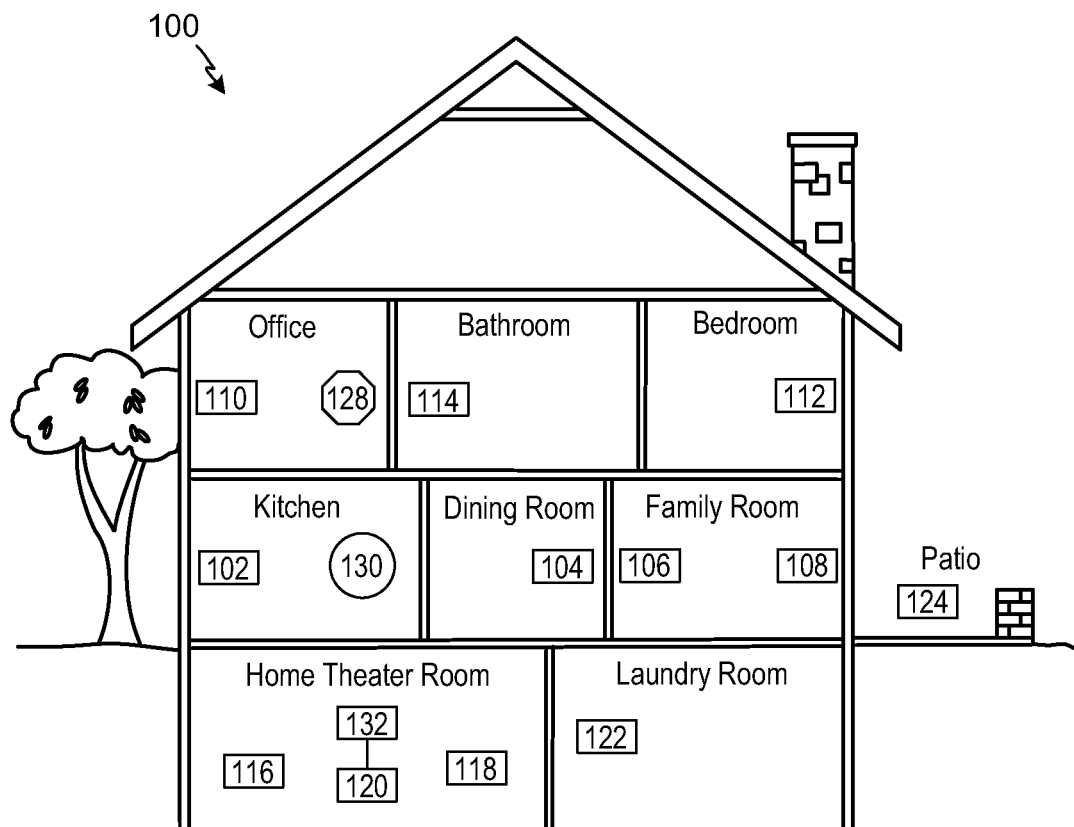


FIGURE 1

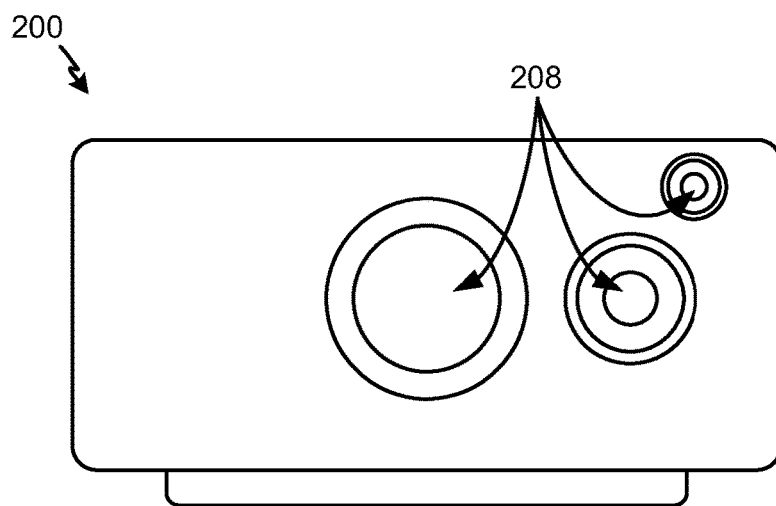


FIGURE 2A

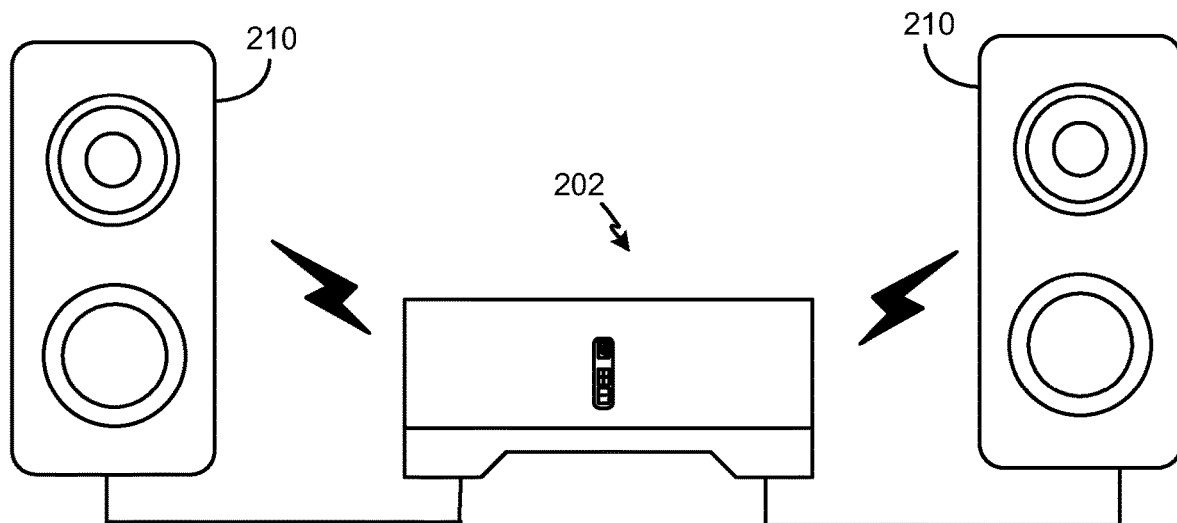


FIGURE 2B

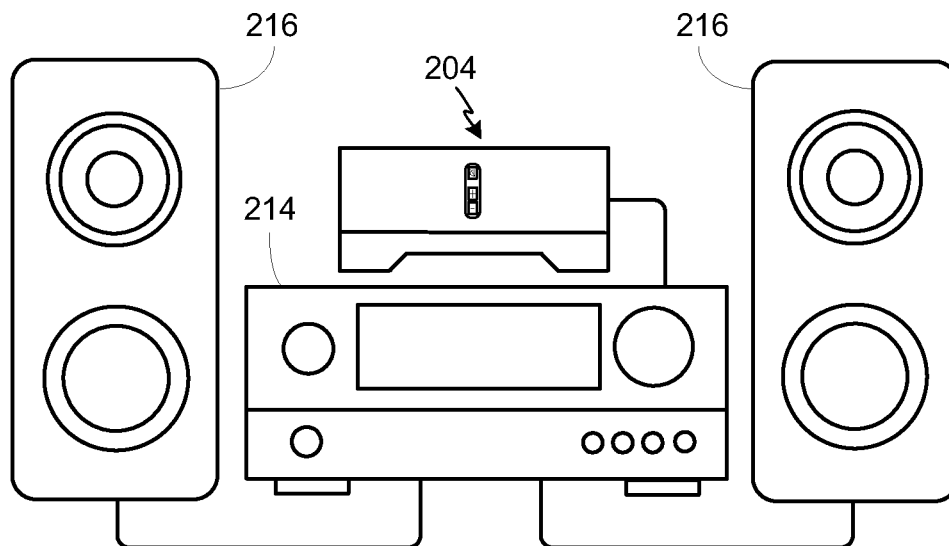


FIGURE 2C

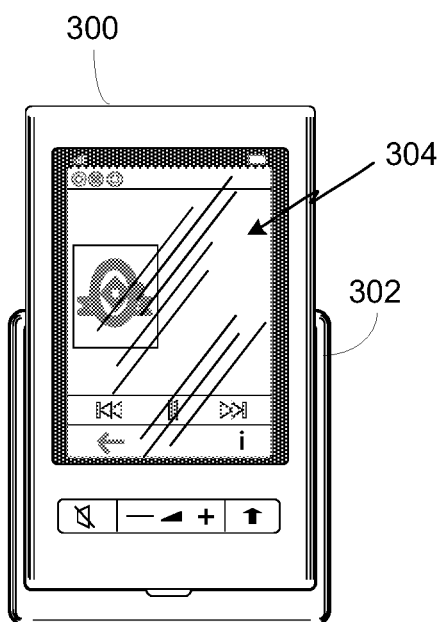


FIGURE 3

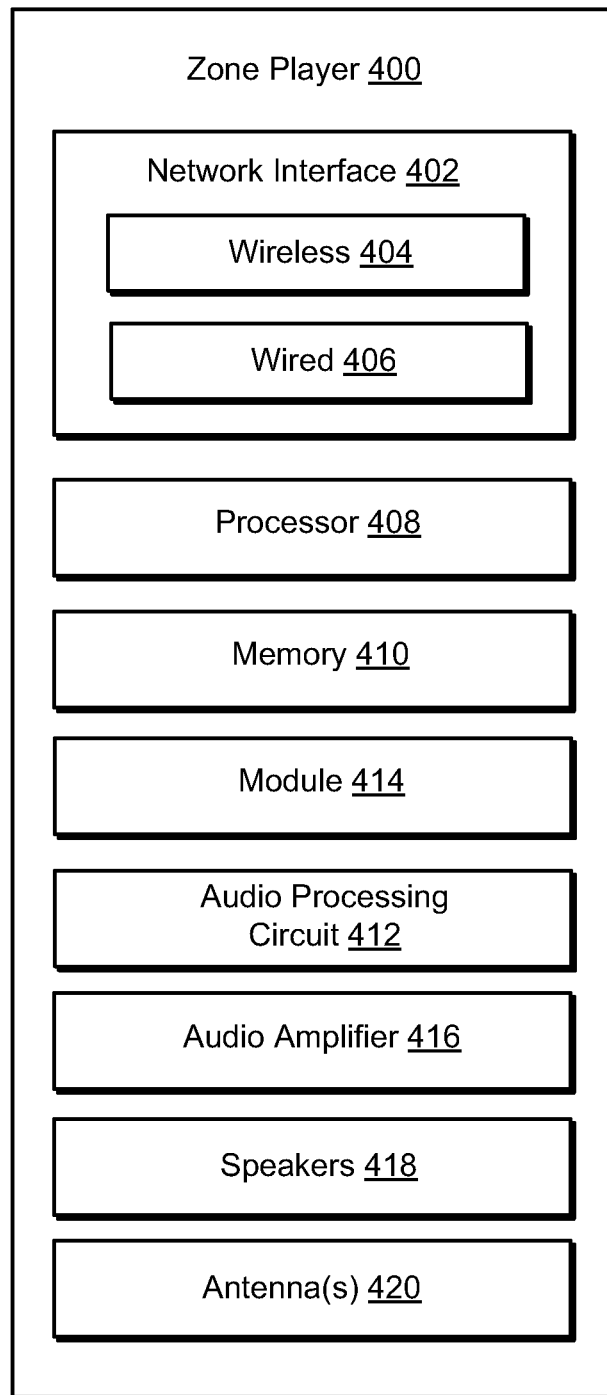


FIGURE 4

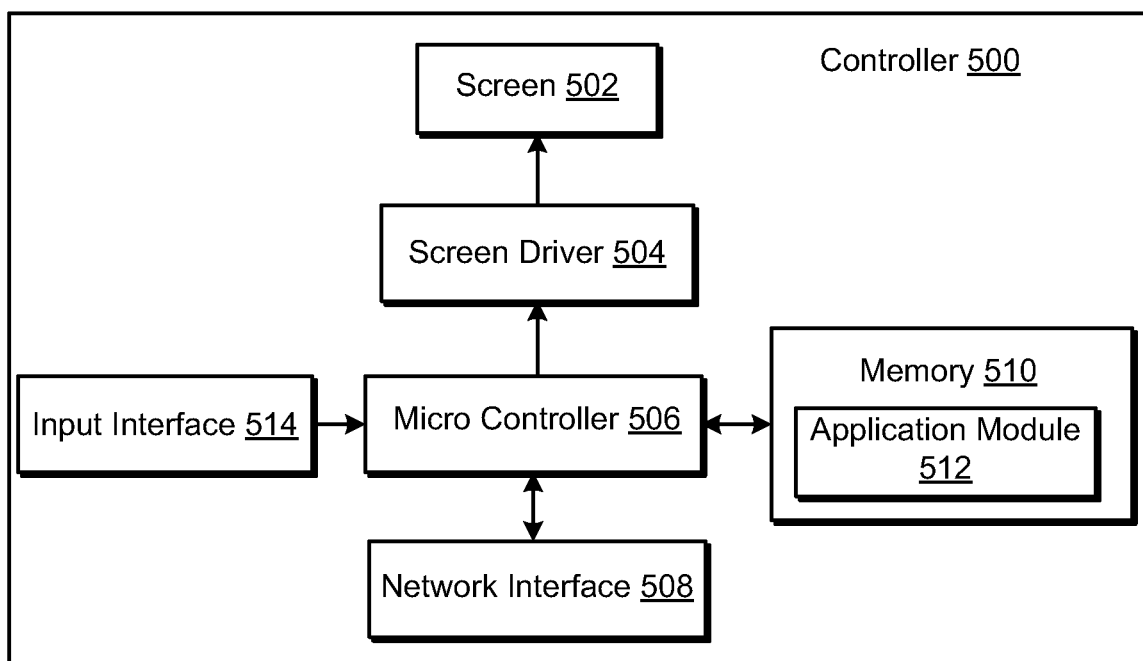


FIGURE 5

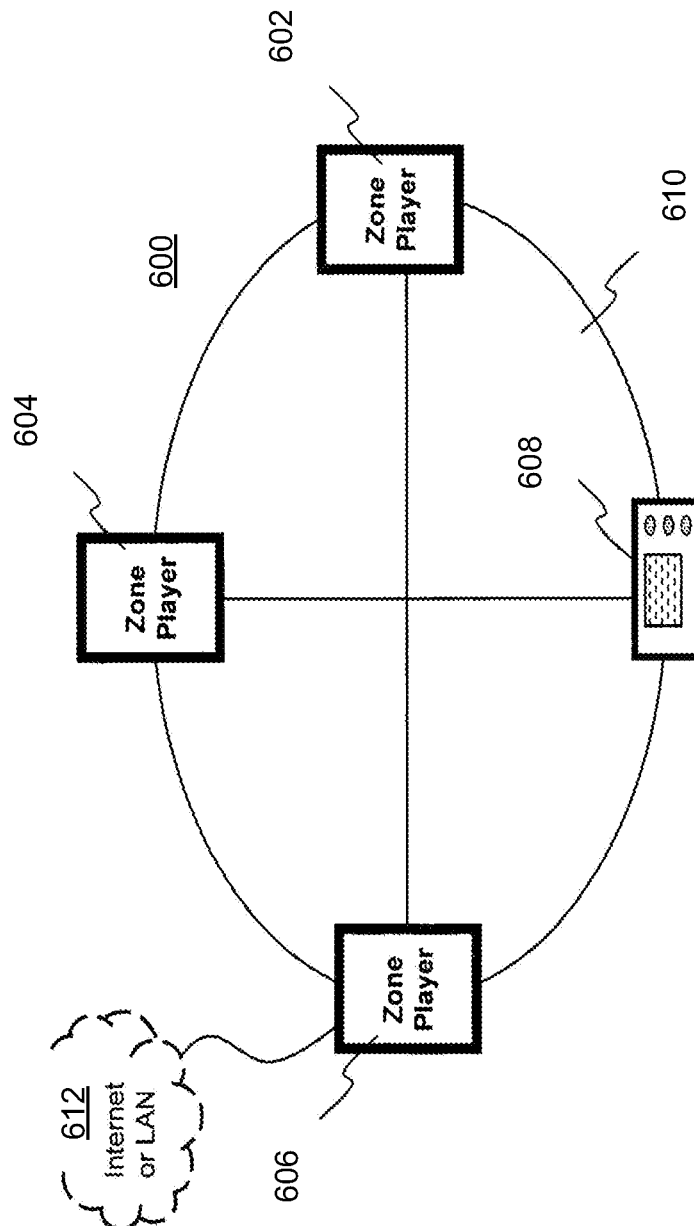
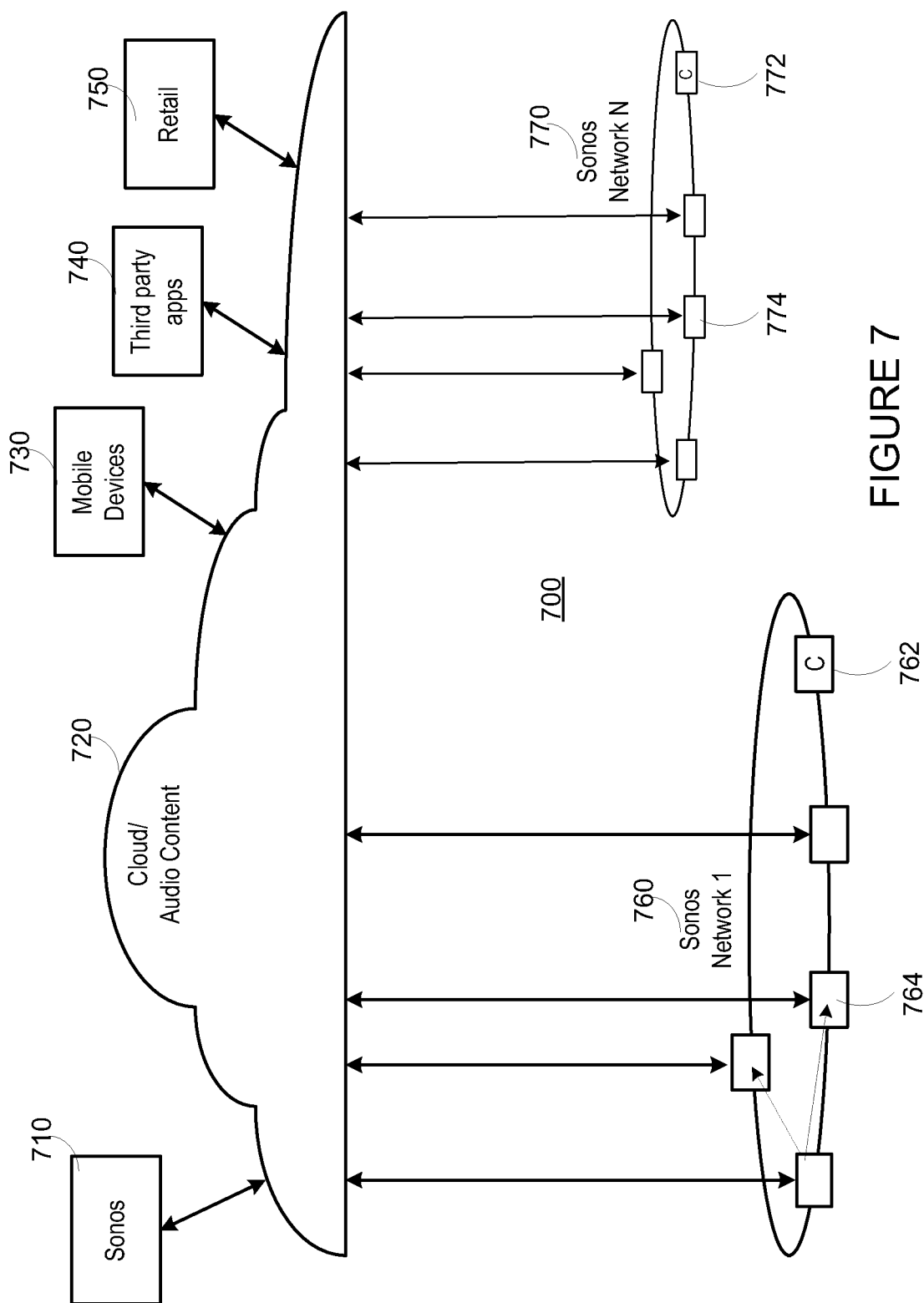


FIGURE 6



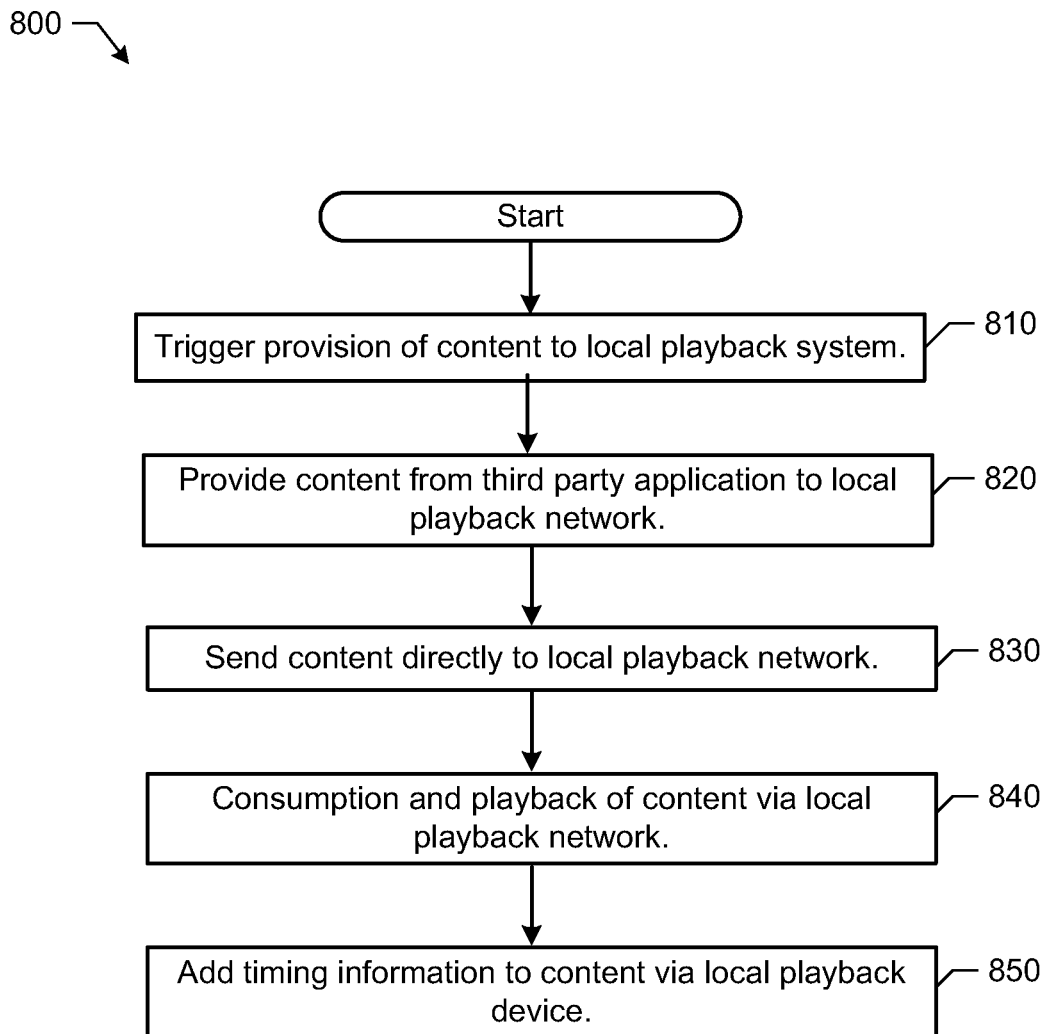


FIGURE 8

900 ↘

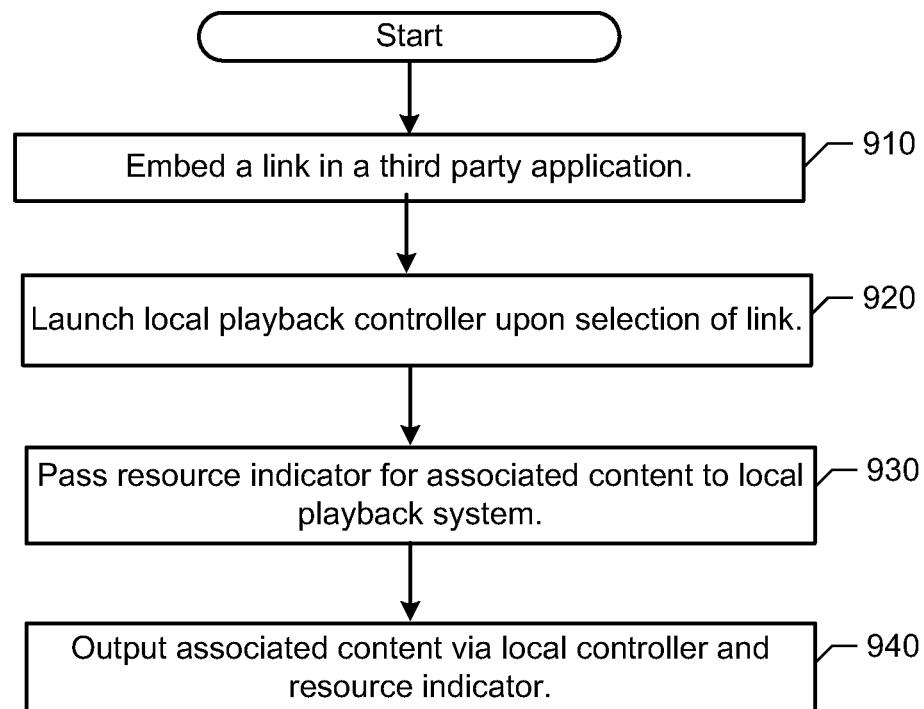


FIGURE 9

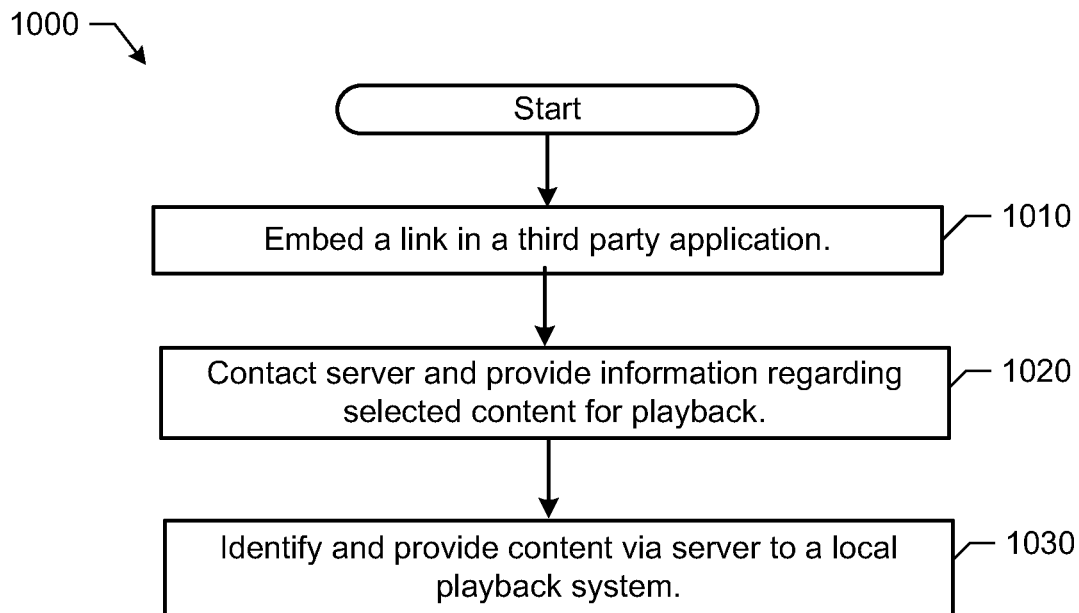


FIGURE 10

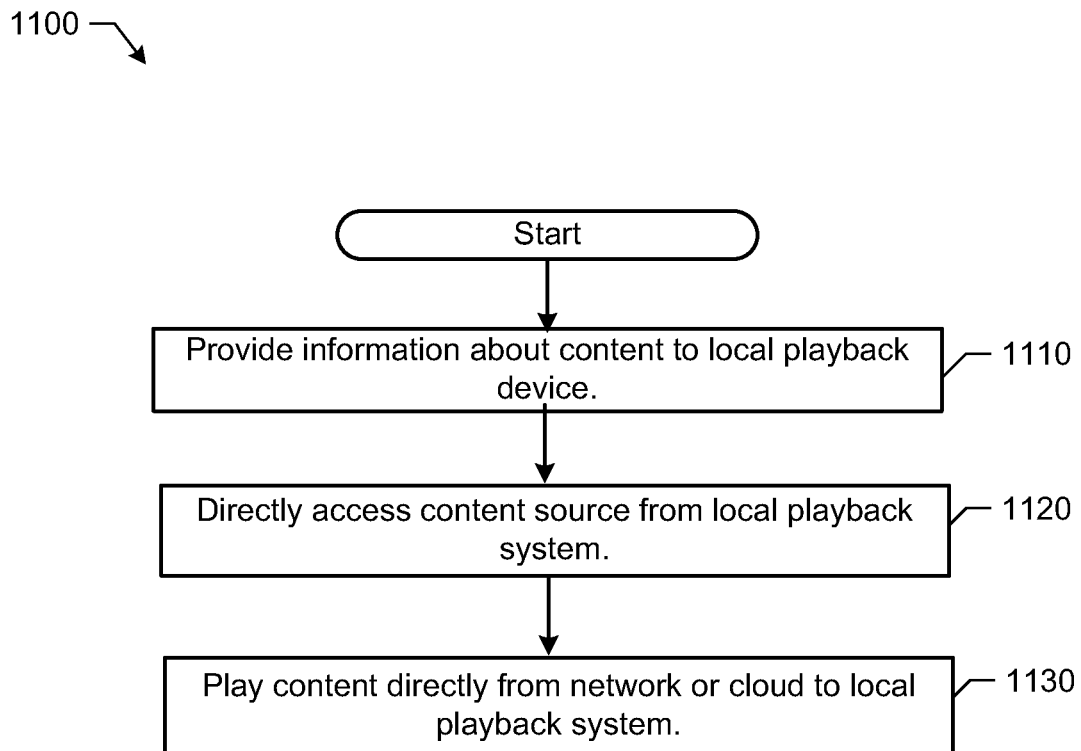


FIGURE 11

US 10,779,033 B2

1

**SYSTEMS AND METHODS FOR
NETWORKED MUSIC PLAYBACK****CROSS REFERENCE TO RELATED
APPLICATIONS**

This application is a continuation of U.S. non-provisional patent application Ser. No. 15/872,500, filed on Jan. 16, 2018, entitled "Systems and Methods for Networked Music Playback," which is a continuation of U.S. non-provisional patent application Ser. No. 14/520,578, filed on Oct. 22, 2014, entitled "Systems and Methods for Networked Music Playback," which is a continuation of U.S. non-provisional patent application Ser. No. 13/341,237, filed on Dec. 30, 2011, entitled "Systems and Methods for Networked Music Playback," all of which are incorporated herein by reference in their entirety.

FIELD OF THE DISCLOSURE

The disclosure is related to consumer electronics and, more particularly, to providing music for playback via one or more devices on a playback data network.

BACKGROUND

Technological advancements have increased the accessibility of music content, as well as other types of media, such as television content, movies, and interactive content. For example, a user can access audio, video, or both audio and video content over the Internet through an online store, an Internet radio station, an online music service, an online movie service, and the like, in addition to the more traditional avenues of accessing audio and video content. Demand for such audio and video content continues to surge. Given the high demand, technology used to access and play such content has likewise improved.

BRIEF DESCRIPTION OF THE DRAWINGS

Features, aspects, and advantages of the presently disclosed technology are better understood with regard to the following description, appended claims, and accompanying drawings where:

FIG. 1 shows an illustration of an example system in which embodiments of the methods and apparatus disclosed herein can be implemented;

FIG. 2A shows an illustration of an example zone player having a built-in amplifier and speakers;

FIG. 2B shows an illustration of an example zone player having a built-in amplifier and connected to external speakers;

FIG. 2C shows an illustration of an example zone player connected to an A/V receiver and speakers;

FIG. 3 shows an illustration of an example controller;

FIG. 4 shows an internal functional block diagram of an example zone player;

FIG. 5 shows an internal functional block diagram of an example controller;

FIG. 6 shows an example ad-hoc playback network;

FIG. 7 shows a system including a plurality of networks including a cloud-based network and at least one local playback network; and

FIGS. 8-11 show flow diagrams for methods to provide audio content to a local playback system.

2

In addition, the drawings are for the purpose of illustrating example embodiments, but it is understood that the present disclosure is not limited to the arrangements and instrumentality shown in the drawings.

DETAILED DESCRIPTION**I. Overview**

Wired or wireless networks can be used to connect one or more multimedia playback devices for a home or other location playback network (e.g., a home music system). Certain examples provide automatic configuration of parameters of a playback device to be coupled to a network with reduced or minimum human intervention. For example, a wired and/or wireless ad-hoc network is established to facilitate communications among a group of devices. Music and/or other multimedia content can be shared among devices and/or groups of devices (also referred to herein as zones) associated with a playback network.

Certain embodiments facilitate streaming or otherwise providing music from a music-playing application (e.g., browser-based application, native music player, other multimedia application, and so on) to a multimedia content playback (e.g., Sonos™) system. Certain embodiments provide simple, easy-to-use and secure systems and methods for multimedia content playback across a plurality of systems and locations. Certain embodiments facilitate integration between content partners and a playback system as well as supporting maintenance of such content and system.

Although the following discloses example systems, methods, apparatus, and articles of manufacture including, among other components, firmware and/or software executed on hardware, it should be noted that such systems, methods, apparatus, and/or articles of manufacture are merely illustrative and should not be considered as limiting. For example, it is contemplated that any or all of these firmware, hardware, and/or software components could be embodied exclusively in hardware, exclusively in software, exclusively in firmware, or in any combination of hardware, software, and/or firmware. Accordingly, while the following describes example systems, methods, apparatus, and/or articles of manufacture, the examples provided are not the only way(s) to implement such systems, methods, apparatus, and/or articles of manufacture.

When any of the appended claims are read to cover a purely software and/or firmware implementation, at least one of the elements in at least one example is hereby expressly defined to include a tangible medium such as a memory, DVD, CD, Blu-ray, and so on, storing the software and/or firmware.

Reference herein to "embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one example embodiment of the invention. The appearances of this phrase in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. As such, the embodiments described herein, explicitly and implicitly understood by one skilled in the art, can be combined with other embodiments.

Certain embodiments provide a method to provide content to a local playback network. The example method includes identifying multimedia content from a content provider. The example method includes passing information regarding the multimedia content to a local playback system including one or more multimedia playback devices in response to a trigger. The example method includes facilitating play of the

multimedia content via a local playback network associated with the local playback system.

Certain embodiments provide a computer readable storage medium including instructions for execution by a processor, the instructions, when executed, cause the processor to implement a method to provide content to a local playback network. The example method includes identifying multimedia content from a content provider. The example method includes passing information regarding the multimedia content to a local playback system including one or more multimedia playback devices in response to a trigger. The example method includes facilitating play of the multimedia content via a local playback network associated with the local playback system.

Certain embodiments provide a multimedia playback device including a wireless communication interface to communicate with a local playback network and a multimedia content source and a processor. The process is to identify multimedia content from the multimedia content source; pass information regarding the multimedia content to device on the local playback network in response to a trigger; and facilitate play of the multimedia content via the devices on the local playback network.

II. Example Environment

Referring now to the drawings, in which like numerals can refer to like parts throughout the figures, FIG. 1 shows an example system configuration 100 in which one or more of the method and/or apparatus disclosed herein can be practiced or implemented. By way of illustration, the system configuration 100 represents a home with multiple zones. Each zone, for example, represents a different room or space, such as an office, bathroom, bedroom, kitchen, dining room, family room, home theater room, utility or laundry room, and patio. While not shown here, a single zone can cover more than one room or space. One or more of zone players 102-124 are shown in each respective zone. A zone player 102-124, also referred to as a playback device, multimedia unit, speaker, and so on, provides audio, video, and/or audiovisual output. A controller 130 (e.g., shown in the kitchen for purposes of illustration) provides control to the system configuration 100. The system configuration 100 illustrates an example whole house audio system, though it is understood that the technology described herein is not limited to its particular place of application or to an expansive system like a whole house audio system 100 of FIG. 1.

FIGS. 2A, 2B, and 2C show example illustrations of zone players 200-204. The zone players 200-204 of FIGS. 2A, 2B, and 2C, respectively, can correspond to any of the zone players 102-124 of FIG. 1. While certain embodiments provide multiple zone players, an audio output can be generated using only a single zone player. FIG. 2A illustrates a zone player 200 including sound producing equipment 208 capable of generating sound or an audio output corresponding to a signal received (e.g., wirelessly and/or via a wired interface). The sound producing equipment 208 of the zone player 200 of FIG. 2A includes a built-in amplifier (not shown in this illustration) and speakers (e.g., a tweeter, a mid-range driver, and/or a subwoofer). In certain embodiments, the zone player 200 of FIG. 2A can be configured to play stereophonic audio or monaural audio. In some embodiments, the zone player 200 of FIG. 2A can be configured as a component in a combination of zone players to play stereophonic audio, monaural audio, and/or surround audio. As described in greater detail below, in some embodiments, the example zone player 200 of FIG. 2A can also transmit a second signal to, for example, other zone player(s) in the same or different zone(s), speaker(s), receiver(s), and so on.

er(s), and so on. Transmission of the second signal can be part of, for example, a system in which multiple zone players, speakers, receivers, and so on, form a network to, for example, present media content in a synchronization or distributed manner.

The example zone player 202 of FIG. 2B includes a built-in amplifier (not shown in this illustration) to power a set of detached speakers 210. The speakers 210 of FIG. 2B can include, for example, any type of loudspeaker. The zone player 202 of FIG. 2B can communicate a signal corresponding to audio content to the detached speakers 210 via wired and/or wireless channels. Instead of receiving and generating audio content as in FIG. 2A, the zone player 202 of FIG. 2B receives the audio content and transmits the same (e.g., after processing the received signal) to the detached speakers 210. Similar to the example zone player 200 of FIG. 2A, in some embodiments the zone player 202 can transmit a second signal to, for example, other zone player(s) in the same or different zone(s), speaker(s), receiver(s), and so on.

The example zone player 204 of FIG. 2C does not include an amplifier, but allows a receiver 214, or another audio and/or video type device with built-in amplification, to connect to a data network 128 of FIG. 1 and to play audio received over the data network 128 via the receiver 214 and a set of detached speakers 216. In addition to the wired couplings shown in FIG. 2C, the detached speakers 216 can receive audio content via a wireless communication channel between the detached speakers 216 and, for example, the zone player 204 and/or the receiver 214. In some embodiments the zone player 202 can transmit a second signal to, for example, other zone player(s) in the same or different zone(s), speaker(s), receiver(s), and so on.

Example zone players include a “Sonos® S5,” “Sonos Play:5,” “Sonos Play:3,” “ZonePlayer 120,” and “ZonePlayer 90,” which are offered by Sonos, Inc. of Santa Barbara, Calif. Any other past, present, and/or future zone players can additionally or alternatively be used to implement the zone players of example embodiments disclosed herein. A zone player can also be referred to herein as a playback device, and a zone player is not limited to the particular examples illustrated in FIGS. 2A, 2B, and 2C. For example, a zone player can include a wired or wireless headphone. In other examples, a zone player might include a subwoofer. In yet other examples, a zone player can include a sound bar. In an example, a zone player can include or interact with a docking station for an Apple iPod™ or similar device. In some embodiments, a zone player can relay one or more signals received from, for example, a first zone player to another playback device. In some embodiments, a zone player can receive a first signal and generate an output corresponding to the first signal and, simultaneously or separately, can receive a second signal and transmit or relay the second signal to another zone player(s), speaker(s), receiver(s), and so on. Thus, an example zone player described herein can act as a playback device and, at the same time, operate as a hub in a network of zone players. In such instances, media content corresponding to the first signal can be different from the media content corresponding to the second signal.

FIG. 3 shows an example illustration of a wireless controller 300 in a docking station 302. The controller 300 can correspond to the controlling device 130 of FIG. 1. The controller 300 is provided with a touch screen 304 that allows a user to interact with the controller 300, for example, to retrieve and navigate a playlist of audio items, control operations of one or more zone players, and provide overall

5

control of the system configuration **100**. In certain embodiments, any number of controllers can be used to control the system configuration **100**. In certain embodiments, there can be a limit on the number of controllers that can control the system configuration **100**. The controllers might be wireless like wireless controller **300** or wired to the data network **128**. Furthermore, an application running on any network-enabled portable devices, such as an iPhone™, iPad™, Android™ powered phone, or any other smart phone or network-enabled device can be used as a controller by connecting to the data network **128**. An application running on a laptop or desktop PC or Mac can also be used as a controller. Example controllers include a “Sonos® Controller **200**,” “Sonos® Controller for iPhone,” “Sonos® Controller for iPad,” “Sonos® Controller for Android,” “Sonos® Controller for Mac or PC,” which are offered by Sonos, Inc. of Santa Barbara, Calif. The flexibility of such an application and its ability to be ported to a new type of portable device is advantageous.

Referring back to the system configuration **100** of FIG. 1, a particular zone can contain one or more zone players. For example, the family room of FIG. 1 contains two zone players **106** and **108**, while the kitchen is shown with one zone player **102**. Zones can be dynamically configured by positioning a zone player in a room or space and assigning via the controller **130** the zone player to a new or existing zone. As such, zones can be created, combined with another zone, removed, and given a specific name (e.g., “Kitchen”), if so programmed. The zone players **102** to **124** are coupled directly or indirectly to a data network, such as the data network **128** shown in FIG. 1. The data network **128** is represented by an octagon in the figure to stand out from other components shown in the figure. While the data network **128** is shown in a single location, it is understood that such a network can be distributed in and around the system configuration **100**.

Particularly, the data network **128** can be a wired network, a wireless network, or a combination of both. In some embodiments, one or more of the zone players **102-124** are wirelessly coupled to the data network **128** based on a proprietary mesh network. In some embodiments, one or more of the zone players **102-124** are wirelessly coupled to the data network **128** using a non-mesh topology. In some embodiments, one or more of the zone players **102-124** are coupled via a wire to the data network **128** using Ethernet or similar technology. In addition to the one or more zone players **102-124** connecting to the data network **128**, the data network **128** can further allow access to a wide area network, such as the Internet.

In certain embodiments, the data network **128** can be created by connecting any of the zone players **102-124**, or some other connecting device, to a broadband router. Other zone players **102-124** can then be added wired or wirelessly to the data network **128**. For example, a zone player (e.g., any of zone players **102-124**) can be added to the system configuration **100** by simply pressing a button on the zone player itself, which enables a connection to be made to the data network **128**. The broadband router can be connected to an Internet Service Provider (ISP), for example. The broadband router can be used to form another data network within the system configuration **100**, which can be used in other applications (e.g., web surfing). The data network **128** can also be used in other applications, if so programmed. Further, in certain embodiments, the data network **128** is the same network used for other applications in the household.

In certain embodiments, each zone can play from the same audio source as another zone or each zone can play

6

from a different audio source. For example, someone can be grilling on the patio and listening to jazz music via zone player **124**, while someone is preparing food in the kitchen and listening to classical music via zone player **102**. Further, someone can be in the office listening to the same jazz music via zone player **110** that is playing on the patio via zone player **124**. In some embodiments, the jazz music played via zone players **110** and **124** is played in synchrony. Synchronizing playback amongst zones allows for someone to pass through zones while seamlessly listening to the audio. Further, zones can be put into a “party mode” such that all associated zones will play audio in synchrony.

In certain embodiments, a zone contains two or more zone players. For example, the family room contains two zone players **106** and **108**, and the home theater room contains at least zone players **116**, **118**, and **120**. A zone can be configured to contain as many zone players as desired, and for example, the home theater room might contain additional zone players to play audio from a 5.1 channel or greater audio source (e.g., a movie encoded with 5.1 or greater audio channels). If a zone contains two or more zone players, such as the two zone players **106** and **108** in the family room, then the two zone players **106** and **108** can be configured to play the same audio source in synchrony, or the two zone players **106** and **108** can be paired to play two separate sounds in left and right channels, for example. In other words, the stereo effects of a sound can be reproduced or enhanced through the two zone players **106** and **108**, one for the left sound and the other for the right sound. In certain embodiments, paired zone players can play audio in synchrony with other zone players.

In certain embodiments, three or more zone players can be configured to play various channels of audio that is encoded with three channels or more sound. For example, the home theater room shows zone players **116**, **118**, and **120**. If the sound is encoded as 2.1 channel audio, then the zone player **116** can be configured to play left channel audio, the zone player **118** can be configured to play right channel audio, and the zone player **120** can be configured to play bass frequencies. Other configurations are possible and depend on the number of zone players and the type of audio. Further, a particular zone can be configured to play a 5.1 channel audio in one instance, such as when playing audio from a movie, and then dynamically switch to play stereo, such as when playing audio from a two channel source.

In certain embodiments, two or more zone players can be sonically consolidated to form a single, consolidated zone player. A consolidated zone player (though made up of multiple, separate devices) can be configured to process and reproduce sound differently than an unconsolidated zone player or zone players that are paired, because a consolidated zone player will have additional speaker drivers from which sound can be passed. The consolidated zone player can further be paired with a single zone player or yet another consolidated zone player. Each playback device of a consolidated playback device is preferably set in a consolidated mode.

According to some embodiments, one can continue to do any of: group, consolidate, and pair zone players, for example, until a desired configuration is complete. The actions of grouping, consolidation, and pairing are preferably performed through a control interface, such as using controller **130**, and not by physically connecting and reconnecting speaker wire, for example, to individual, discrete speakers to create different configurations. As such, certain

embodiments described herein provide a more flexible and dynamic platform through which sound reproduction can be offered to the end-user.

Sources of audio content to be played by zone players 102-124 are numerous. Music from a personal library stored on a computer or networked-attached storage (NAS) can be accessed via the data network 128 and played. Internet radio stations, shows, and podcasts can be accessed via the data network 128. Music services that let a user stream and download music and audio content can be accessed via the data network 128. Further, music can be obtained from traditional sources, such as a turntable or CD player, via a line-in connection to a zone player, for example. Audio content can also be accessed through AirPlay™ wireless technology by Apple, Inc., for example. Audio content received from one or more sources can be shared amongst the zone players 102 to 124 via the data network 128 and/or the controller 130. The above-disclosed sources of audio content are referred to herein as network-based audio information sources. However, network-based audio information sources are not limited thereto.

The example home theater zone players 116, 118, 120 are coupled to an audio information source such as a television 132. In some examples, the television 132 is used as a source of audio for the home theater zone players 116, 118, 120, while in other examples audio information from the television 132 can be shared with any of the zone players 102-124 in the audio system 100.

III. Example Playback Device

Referring now to FIG. 4, there is shown an example functional block diagram of a zone player 400 in accordance with an embodiment. The zone player 400 of FIG. 4 includes a network interface 402, a processor 408, a memory 410, an audio processing component 412, a module 414, an audio amplifier 416, and a speaker unit 418 coupled to the audio amplifier 416. FIG. 2A shows an example illustration of such a zone player. Other types of zone players can not include the speaker unit 418 (e.g., such as shown in FIG. 2B) or the audio amplifier 416 (e.g., such as shown in FIG. 2C). Further, it is contemplated that the zone player 400 can be integrated into another component. For example, the zone player 400 could be constructed as part of a lamp for indoor or outdoor use.

Referring back to FIG. 4, the network interface 402 facilitates a data flow between zone players and other devices on a data network (e.g., the data network 128 of FIG. 1) and the zone player 400. In some embodiments, the network interface 402 can manage the assembling of an audio source or file into smaller packets that are to be transmitted over the data network or reassembles received packets into the original source or file. In some embodiments, the network interface 402 can further handle the address part of each packet so that it gets to the right destination or intercepts packets destined for the zone player 400. Accordingly, in certain embodiments, each of the packets includes an Internet Protocol (IP)-based source address as well as an IP-based destination address.

In some embodiments, the network interface 402 can include one or both of a wireless interface 404 and a wired interface 406. The wireless interface 404, also referred to as an RF interface, provides network interface functions for the zone player 400 to wirelessly communicate with other devices (e.g., other zone player(s), speaker(s), receiver(s), component(s) associated with the data network 128, and so on) in accordance with a communication protocol (e.g., any of the wireless standards IEEE 802.11a, 802.11b, 802.11g, 802.11n, or 802.15). To receive wireless signals and to

provide the wireless signals to the wireless interface 404 and to transmit wireless signals, the zone player 400 of FIG. 4 includes one or more antennas 420. The wired interface 406 provides network interface functions for the zone player 400 to communicate over a wire with other devices in accordance with a communication protocol (e.g., IEEE 802.3). In some embodiments, a zone player includes both of the interfaces 404 and 406. In some embodiments, a zone player 400 includes only the wireless interface 404 or the wired interface 406.

In some embodiments, the processor 408 is a clock-driven electronic device that is configured to process input data according to instructions stored in memory 410. The memory 410 is data storage that can be loaded with one or more software modules 414, which can be executed by the processor 408 to achieve certain tasks. In the illustrated embodiment, the memory 410 is a tangible machine readable medium storing instructions that can be executed by the processor 408. In some embodiments, a task might be for the zone player 400 to retrieve audio data from another zone player or a device on a network. In some embodiments, a task might be for the zone player 400 to send audio data to another zone player or device on a network. In some embodiments, a task might be for the zone player 400 to synchronize playback of audio with one or more additional zone players. In some embodiments, a task might be to pair the zone player 400 with one or more zone players to create a multi-channel audio environment. Additional or alternative tasks can be achieved via the one or more software modules 414 and the processor 408.

The audio processing component 412 can include one or more digital-to-analog converters (DAC), an audio pre-processing component, an audio enhancement component or a digital signal processor, and so on. In certain embodiments, the audio that is retrieved via the network interface 402 is processed and/or intentionally altered by the audio processing component 412. Further, the audio processing component 412 can produce analog audio signals. The processed analog audio signals are then provided to the audio amplifier 416 for play back through speakers 418. In addition, the audio processing component 412 can include necessary circuitry to process analog or digital signals as inputs to play from zone player 400, send to another zone player on a network, or both play and send to another zone player on the network. An example input includes a line-in connection (e.g., an auto-detecting 3.5 mm audio line-in connection).

The audio amplifier 416 is a device that amplifies audio signals to a level for driving one or more speakers 418. The one or more speakers 418 can include an individual transducer (e.g., a “driver”) or a complete speaker system that includes an enclosure including one or more drivers. A particular driver can be a subwoofer (for low frequencies), a mid-range driver (middle frequencies), and a tweeter (high frequencies), for example. An enclosure can be sealed or ported, for example.

A zone player 400 can also be referred to herein as a playback device. An example playback device includes a Sonos® Play:5, which is manufactured by Sonos, Inc. of Santa Barbara, Calif. The Play:5 is an example zone player with a built-in amplifier and speakers. In particular, the Play:5 is a five-driver speaker system that includes two tweeters, two mid-range drivers, and one subwoofer. When playing audio content via the Play:5, the left audio data of a track is sent out of the left tweeter and left mid-range driver, the right audio data of a track is sent out of the right tweeter and the right mid-range driver, and mono bass is sent out of the subwoofer. Further, both mid-range drivers and

both tweeters have the same equalization (or substantially the same equalization). That is, they are both sent the same frequencies, just from different channels of audio. Audio from Internet radio stations, online music and video services, downloaded music, analog audio inputs, television, DVD, and so on, can be played from a Sonos® Play:5. While the Play:5 is an example of a zone player with speakers, it is understood that a zone player with speakers is not limited to one with a certain number of speakers (e.g., five speakers as in the Play:5), but rather can contain one or more speakers. Further, a zone player can be part of another device, which might even serve a purpose different than audio (e.g., a lamp).

IV. Example Controller

Referring now to FIG. 5, there is shown an example controller 500, which can correspond to the controlling device 130 in FIG. 1. The controller 500 can be used to facilitate the control of multi-media applications, automation and others in a system. In particular, the controller 500 is configured to facilitate a selection of a plurality of audio sources available on the network and enable control of one or more zone players (e.g., the zone players 102-124 in FIG. 1) through a wireless network interface 508. According to one embodiment, the wireless communications is based on an industry standard (e.g., infrared, radio, wireless standards IEEE 802.11a, 802.11b 802.11g, 802.11n, or 802.15). Further, when a particular audio is being accessed via the controller 500 or being played via a zone player, a picture (e.g., album art) or any other data, associated with the audio source can be transmitted from a zone player or other electronic device to the controller 500 for display.

The controller 500 is provided with a screen 502 and an input interface 514 that allows a user to interact with the controller 500, for example, to navigate a playlist of many multimedia items and to control operations of one or more zone players. The screen 502 on the controller 500 can be an LCD screen, for example. The screen 500 communicates with and is commanded by a screen driver 504 that is controlled by a microcontroller (e.g., a processor) 506. The memory 510 can be loaded with one or more application modules 512 that can be executed by the microcontroller 506 with or without a user input via the user interface 514 to achieve certain tasks. In some embodiments, an application module 512 is configured to facilitate grouping a number of selected zone players into a zone group and synchronizing the zone players for audio play back. In some embodiments, an application module 512 is configured to control the audio sounds (e.g., volume) of the zone players in a zone group. In operation, when the microcontroller 506 executes one or more of the application modules 512, the screen driver 504 generates control signals to drive the screen 502 to display an application specific user interface accordingly.

The controller 500 includes a network interface 508 that facilitates wireless communication with a zone player. In some embodiments, the commands such as volume control and audio playback synchronization are sent via the network interface 508. In some embodiments, a saved zone group configuration is transmitted between a zone player and a controller via the network interface 508. The controller 500 can control one or more zone players, such as 102-124 of FIG. 1. There can be more than one controller for a particular system. Further, a controller can be integrated into a zone player.

It should be noted that other network-enabled devices such as an iPhone®, iPad® or any other smart phone or network-enabled device (e.g., a networked computer such as

a PC or Mac®) can also be used as a controller to interact or control zone players in a particular environment. In some embodiments, a software application or upgrade can be downloaded onto a network enabled device to perform the functions described herein.

In certain embodiments, a user can create a zone group including at least two zone players from the controller 500. The zone players in the zone group can play audio in a synchronized fashion, such that all of the zone players in the zone group play back an identical audio source or a list of identical audio sources in a synchronized manner such that no (or substantially no) audible delays or hiccups could be heard. Similarly, in some embodiments, when a user increases the audio volume of the group from the controller 500, the signals or data of increasing the audio volume for the group are sent to one of the zone players and causes other zone players in the group to be increased together in volume.

A user via the controller 500 can group zone players into a zone group by activating a “Link Zones” or “Add Zone” soft button, or de-grouping a zone group by activating an “Unlink Zones” or “Drop Zone” button. For example, one mechanism for ‘joining’ zone players together for audio play back is to link a number of zone players together to form a group. To link a number of zone players together, a user can manually link each zone player or room one after the other. For example, assume that there is a multi-zone system that includes the following zones: Bathroom, Bedroom, Den, Dining Room, Family Room, and Foyer.

In certain embodiments, a user can link any number of the six zone players, for example, by starting with a single zone and then manually linking each zone to that zone.

In certain embodiments, a set of zones can be dynamically linked together using a command to create a zone scene or theme (subsequent to first creating the zone scene). For instance, a “Morning” zone scene command can link the Bedroom, Office, and Kitchen zones together in one action. Without this single command, the user would need to manually and individually link each zone. The single command might include a mouse click, a double mouse click, a button press, a gesture, or some other programmed action. Other kinds of zone scenes can be programmed.

In certain embodiments, a zone scene can be triggered based on time (e.g., an alarm clock function). For instance, a zone scene can be set to apply at 8:00 am. The system can link appropriate zones automatically, set specific music to play, and then stop the music after a defined duration. Although any particular zone can be triggered to an “On” or “Off” state based on time, for example, a zone scene enables any zone(s) linked to the scene to play a predefined audio (e.g., a favorable song, a predefined playlist) at a specific time and/or for a specific duration. If, for any reason, the scheduled music failed to be played (e.g., an empty playlist, no connection to a share, failed Universal Plug and Play (UPnP), no Internet connection for an Internet Radio station, and so on), a backup buzzer can be programmed to sound. The buzzer can include a sound file that is stored in a zone player, for example.

V. Example Ad-Hoc Network

Certain particular examples will now be provided in connection with FIGS. 6-8B to describe, for purposes of illustration only, certain base systems and methods to provide and facilitate connection to a playback network. FIG. 6 shows that there are three zone players 602, 604 and 606 and a controller 608 that form a network branch that is also referred to as an Ad-Hoc network 610. The network 610 may be wireless, wired, or a combination of wired and wireless. In general, an Ad-Hoc (or “spontaneous”) network is a local

area network or other small network in which there is no one access point for all traffic. With an established Ad-Hoc network **610**, the devices **602**, **604**, **606** and **608** can all communicate with each other in a “peer-to-peer” style of communication, for example. Furthermore, devices may come/and go from the network **610**, and the network **610** will automatically reconfigure itself without needing the user to reconfigure the network **610**.

Using the Ad-Hoc network **610**, the devices **602**, **604**, **606**, and **608** can share or exchange one or more audio sources and be grouped to play the same or different audio sources. For example, the devices **602** and **604** are grouped to playback one piece of music, and at the same time, the device **606** plays back another piece of music. In other words, the devices **602**, **604**, **606** and **608**, as shown in FIG. **6**, form a HOUSEHOLD that distributes audio and/or reproduces sound. As used herein, the term HOUSEHOLD (provided in uppercase letters to disambiguate from the user’s domicile) is used to represent a collection of networked devices that are cooperating to provide an application or service. An instance of a HOUSEHOLD is identified with a household **10** (or household identifier).

In certain embodiments, a household identifier (HHID) is a short string or an identifier that is computer-generated to help ensure that it is unique. Accordingly, the network **610** can be characterized by a unique HHID and a unique set of configuration variables or parameters, such as channels (e.g., respective frequency bands), SSID (a sequence of alphanumeric characters as a name of a wireless network), and WEP keys (wired equivalent privacy or other security keys). In certain embodiments, SSID is set to be the same as HHID.

In certain embodiments, each HOUSEHOLD includes two types of network nodes: a control point (CP) and a zone player (ZP). The control point controls an overall network setup process and sequencing, including an automatic generation of required network parameters (e.g., WEP keys). In an embodiment, the CP also provides the user with a HOUSEHOLD configuration user interface. The CP function can be provided by a computer running a CP application module, or by a handheld controller (e.g., the controller **308**) also running a CP application module, for example. The zone player is any other device on the network that is placed to participate in the automatic configuration process. The ZP, as a notation used herein, includes the controller **308** or a computing device, for example.

In certain embodiments, configuration of a HOUSEHOLD involves multiple CPs and ZPs that rendezvous and establish a known configuration such that they can use a standard networking protocol (e.g., IP over Wired or Wireless Ethernet) for communication. In an embodiment, two types of networks/protocols are employed: Ethernet **802.3** and Wireless **802.11g**. Interconnections between a CP and a ZP can use either of the networks/protocols. A device in the system as a member of a HOUSEHOLD can connect to both networks simultaneously. In an environment that has both networks in use, it is assumed that at least one device in a system is connected to both as a bridging device, thus providing bridging services between wired/wireless networks for others. The zone player **606** in FIG. **6** is shown to be connected to both networks, for example. The connectivity to the network **612** is based on Ethernet while the connectivity to other devices **602**, **604** and **608** is based on Wireless. It is understood, however, that in some embodiments each zone player **606**, **604**, **602** may access the Internet when retrieving media from the cloud (e.g., Internet) via the bridging device. For example, zone player **602** may contain a uniform resource locator (URL) that specifies

an address to a particular audio track in the cloud. Using the URL, the zone player **602** may retrieve the audio track from the cloud, and ultimately play the audio out of one or more zone players.

VI. Example Music Sharing and Playback Configuration

Certain embodiments enable a user to stream music from a music-playing application (e.g., browser-based application, native music player, other multimedia application, and so on) to a local multimedia content playback (e.g., Sonos™) system. Certain embodiments provide secure systems and methods for multimedia content playback across a plurality of systems and locations. Certain embodiments facilitate integration between content partners and a playback system as well as supporting maintenance of such content and system.

FIG. **7** shows a system including a plurality of networks including a cloud-based network and at least one local playback network. The network includes a plurality of playback devices or players, though it is understood that the network may contain only one playback device. In certain embodiments, each player has an ability to retrieve its content for playback. Control and content retrieval can be distributed or centralized, for example. Input can include streaming content provider input, third party application input, mobile device input, user input, and/or other playback network input into the cloud for local distribution and playback.

As illustrated by the example system **700** of FIG. **7**, a plurality of content providers **720-750** can be connected to one or more local playback networks **760-770** via a cloud and/or other network **710**. Using the cloud **710**, a multimedia playback system **720** (e.g., Sonos™) a mobile device **730**, a third party application **740**, a retail location **750**, and so on can provide multimedia content (requested or otherwise) to local playback networks **760**, **770**. Within each local network **760**, **770**, a controller **762**, **772** and/or playback device **764**, **774** can provide a song identifier, song name, playlist identifier, playlist name, genre, preference, and so on, and/or simply receive content from a connected system via the cloud.

For example, a user listens to a third party music application (e.g., Pandora™ Rhapsody™, Spotify™, and so on) on her smart phone while commuting. She’s enjoying the current channel and, as she walks in the door to her home, selects an option to continue playing that channel on her household music playback system (e.g., Sonos™). The playback system picks up from the same spot on the selected channel that was on her phone and outputs that content (e.g., that song) on speakers and/or other playback devices connected to the household playback system. A uniform resource indicator (URI) (e.g., a uniform resource locator (URL)) can be passed to a playback device to fetch content from a cloud and/or other networked source, for example. A playback device, such as a zone player, can fetch content on its own without use of a controller, for example. Once the zone player has a URL (or some other identification or address) for a song and/or playlist, the zone player can run on its own to fetch the content. Songs and/or other multimedia content can be retrieved from the Internet rather than a local device (e.g., a compact disc (CD)), for example. A third party application can open or utilize an application programming interface (API) to pass music to the household playback system without tight coupling to that household playback system.

In another example of an application determining a playlist and/or other content for playback, a user enjoys listening to music on an online music service (e.g., turntable.fm or

other virtual room that a user can enter to choose from a plurality of online disc jockeys (DJs) deciding what to play next) using his Mac Book Pro™ at home. He likes the unique user experience the service offers, and he frequently hops from room to room discovering new music. To maximize sound quality, he plays the music on his household playback system (e.g., Sonos™). A button or other indicator can be added to the turntable.fm Web application to switch the content being played to the playback system for output (e.g., to the Sonos™ system rather than or in addition to the Mac Book™). While Web-based applications typically do not have access to items on a local network, certain embodiments enable a third-party Web-based application (e.g., Turntable.fm) to talk to a playback system (e.g., Sonos™) in a certain way (e.g., may have to log in with a username and password), and the identified user has the website send audio or audio and video down to a playback device (e.g., a zone player) on the playback system local network to play music there (or some other media).

In another example, a first user creates a playlist (e.g., a Spotify™ playlist). The first user visits a second user's house, pulls out her smart phone and shares her playlist by playing it on the second user's household playback (e.g., Sonos™) system using her third party (e.g., Spotify™) application. The first user may also go to the third party content provider's (e.g., Spotify's™) website and share her playlist on the second user's playback system.

Thus, certain embodiments provide cross-service linking such that a song identifier can be passed from one user and/or service to another to be fetched and played. A user having a playlist on his or her phone can visit a friend and, using her account on her friend's system, play a song to which she has an access right. A retrieved song can be streamed locally to a user's phone, or an application can pass a song identifier to a local playback system which looks up the song identifier and finds an available audio stream to which the user has a right to play and then plays that song.

In another example, a user is staying in a hotel room or other facility including a local playback network. For example, a speaker and/or other playback device (e.g., a Sonos™ Play:3, Play:5 and so on) in a hotel room can be utilized to play multimedia content to which the user has access from his or her playback network account, streaming audio source, third party application, and so on. Content can be output to one or more devices based on availability, access, configuration, priority, preference, and so on. In certain embodiments, a playback network includes a plurality of nodes, and each node has a capability to play sound in response to an input. Requested output is provided to a most logical connection, for example.

In certain embodiments, a phone device, a television device, and so on can be used to play music, audio, video and/or other multimedia content. In an example, a push button on a microphone or household intercom system to tell the kids dinner is ready is provided over the local playback network.

FIG. 8 shows a flow diagram for a method 800 to provide audio content to a local playback system. In the example method 800 of FIG. 8, a third party application acts as a "virtual line-in" to the local playback system. At block 810, streaming of music or other content from a third party application to a local content playback system is triggered. For example, a "Play to Sonos" button is pressed on a Rhapsody™ application. At block 820, content is streamed to one or more components in a household playback network. The music may be streamed to predetermined zones or players in a household, for example. The music may be

further directed to be played in different zones or players throughout the household. Playback on the local network can be facilitated to one or more zones/players based on a configuration (e.g., a zone scene, theme, and so on). Thus, certain embodiments allow a large degree of flexibility in where the music is actually played. For example, the music can be played in the kitchen, the family room, the patio, and so on. Further, the music may be redirected to different zones.

At block 830, the incoming content (e.g., audio) stream is provided directly from a third party application or other external source to the local playback network for playback. For example, rather than passing track identifiers, an audio stream is provided to a Sonos household system for playback to one or more configured zones. At block 840, the local playback system consumes the stream and plays it as it would other content on the local playback (e.g., Sonos™) network (e.g., via zones and so on). At block 850, a playback device (e.g., a zone player, Play:3™, Play:5™, and so on) adds timing information to the streaming content signal (e.g., the device takes the streaming audio signal and repackages it for local synchronized playback). In some embodiments, timing information is not added to the signal unless two or more playback devices are configured to play the audio in synchrony.

FIG. 9 shows a flow diagram for a method 900 to provide audio content to a local playback system. In the example method 900 of FIG. 9, a uniform resource indicator (URI) handler approach is provided for content output. At block 910, a link or other reference is embedded in a third party application (e.g., Facebook™ or Twitter). At block 920, when the link is selected (e.g., clicked), a local playback (e.g., Sonos™) controller, if available, is launched. At block 930, the application (e.g., accessed on a phone, tablet, computer, and so on) passes a URI for associated content (e.g., an audio track and so on) to a local playback system (e.g., Sonos™) controller. At block 940, the local controller outputs the associated content (e.g., plays the music) via the URI. For example, music is streamed from the cloud to one or more playback devices on the local playback network.

In certain embodiments, an application associated with the operating system can register to handle all URIs (URLs) that start with a certain prefix and can define how data is encoded into those URLs so a local playback system application can generate a link (e.g., "sonos:") and put that link into a message (e.g., email, text message, instant message (IM), etc.). The local playback application registered to handle such URLs can parse the URLs to determine what song, playlist, streaming radio station, etc., to play. This launches the controller application. For example, if a first listener likes a song and tweets that song, Twitter™ can include a clickable link which launches a playback application and starts the music playing on a local playback system if the local system can find the song (e.g., if have the application, if have rights/access to the song, etc.). In certain embodiments, the system knows to trigger the receiving user's system rather than the sending user's system to play associated content based on the transmitted link/identifier.

For example, an application can register with the system to handle all URLs that start with a custom prefix (e.g., an HTTP "scheme"). For instance, Sonos controller apps can register to handle any URL that begins with "sonos:" or "x-sonos:". In certain embodiments, a playback system provider can define and publish the format of its URLs so that any third party application can create a link or reference to content. A large amount of data can be encoded into a URL using query parameters, for example.

15

In an example, when an application tries to “open” or “browse” to a URL, the system checks to see if the scheme of the URL matches the “sonos:” scheme that has been registered with the application. If a URL handler application is found, the system launches that application (e.g., the application can but does not need to be running in the background) and passes the URL to the application. The application then parses the URL and executes functionality based on the data in the URL. For example, the URL can contain the name of a music service and a playlist identifier from that service, plus the name of a Sonos™ Zone Player, causing the Sonos controller to start that playlist playing on that zone.

FIG. 10 shows a flow diagram for a method 1000 to provide audio content to a local playback system. In the example method 1000 of FIG. 10, at block 1010, a link or other reference is embedded in a third party application (e.g., Facebook™). At block 1020, when the link is selected, a playback system (e.g., Sonos™) server is contacted and provided with information regarding selected content for playback. For example, rather than launching a local controller application, a server is contacted regarding music for playback on a local network. At block 1030, using the provided information, the server identifies and provides the content locally on a user’s local playback system. For example, the server can then start playing the music directly on the user’s Sonos™ system (e.g., without going through a Sonos™ controller application).

In certain embodiments, a “single sign-on” technology is provided so that the user does not need to re-enter a username and password in order to authenticate to the playback server. Example single sign-on technologies include Facebook Connect™, Windows Live ID™, etc.

In certain embodiments, instead of using a specialized link, such as a “sonos:” link, a normal URL can be used to point to a playback system (e.g., Sonos™) webserver, which generates links with special data embedded in the link. A playback system is identified, and content identified by the URL can be playing at via the local playback network (e.g., mesh network configured for home, hotel room, etc.). Parameters such as authentication, security, location, and so on can be configured for local playback of remote content.

FIG. 11 shows a flow diagram for a method 1100 to provide audio content to a local playback system. The example method 1100 of FIG. 11 provides a “throw it over the wall” approach to content delivery to a local playback system. At block 1110, a third party application provides a multimedia playback device (e.g., a Sonos™ zone player (ZP)) with enough information about content (e.g., an audio track) so that, at block 1120, the local playback system (e.g., SonosNet™) can directly access a source of the content and, at block 1130, play the content directly off the network (e.g., the Internet) or cloud.

In certain embodiments, a local playback controller application is not involved. Information passed over to the local playback device may include an identifier for a single track, a playlist, a streaming radio station, a programmed radio station, and so on. This information can also include a current play position within a list to enable near-seamless “handoff” of music from a portable device to a local playback system. Once the music information is handed from the third-party application to the local playback system, there is no further synchronization between the two systems.

A connection between the third-party application and the local playback device (e.g., Sonos ZonePlayer™) can be direct over a local area network (LAN), remote through a proxy server in the cloud, and so on. A LAN delivery

16

approach may be easier to integrate into “native” applications (e.g., applications written for iOS or Android), and a proxy server approach may be easier for third party applications that are browser-based, for example.

In certain embodiments, information is provided from a third party application to a local playback system without being routed through or by a controller application. Here, the third party application is communicating with the multimedia playback device (e.g., a Sonos ZonePlayer™). Information can be passed locally, rather than through the Internet, for example. The local playback device accesses the Internet to find content to stream, and the third party application takes the place of the controller application (e.g., throw it over the wall—the application passes information and the local playback system runs it).

Certain embodiments provide an approach similar to the “throw it over the wall” or one way communication approach of FIG. 11 except that the third party application not only tells the local playback system what to play, but also maintains two-way communication with the local playback (e.g., Sonos™) system. Two-way communication helps enable features such as keeping a local playback queue synchronized with a queue that the user is editing/managing in the third party application; allow the third party application to know what is currently playing on the local playback system; allow integrated transport control between the third party application and the local playback system; and so on.

In certain embodiments, a local playback system can pass information back to a third party application to indicate a current point of playback (e.g., now playing a third song in a playlist, fourth song in the playlist, and so on). The local playback system can pass parameter information, such as a change in volume, from a local multimedia playback device to the third party application so the application can reflect the change in volume to the user via its graphical user interface. The third party application can instruct the local playback system to skip a song, go to a certain location, and so on.

Certain embodiments provide a third party mode that allows users to select from any local playback network (e.g., Sonos™) controller to listen to audio from one or more third party applications on their smartphones or tablets (e.g., Android™ devices). For example, a user may be using a local playback network controller application and now wants a third party application to appear as an audio source within the controller application. The user can then select the controller application that he or she wishes to play audio from the third party application, for example.

Certain embodiments provide queue management to allow a third party application to control a local playback queue. That is, the local playback system has a queue, but the third party application allows users to add, delete and so on from the queue, for example. Rather than switch from content that the user is currently playing, the local playback system allows a user to create a playlist on the fly. For example, if last.fm users vote that they do not like a song and it should be skipped, then the local playback system will skip it.

Certain embodiments allow a third party application to override a local playback queue with its own application-specific queue. The local playback system periodically fetches a short list of tracks to play next. The list of tracks to play is determined by the third-party application, for example. In certain embodiments, a shared queue is provided between the local playback system and the third party application to keep the local system and application synchronized.

US 10,779,033 B2

17

Certain embodiments allow control of playback system functions and/or settings via an external (e.g., third party) application. For example, a local playback system can allow volume control, play/pause, and so on and can interact with an application running on a given platform/operating system (OS). Certain embodiments provide a Web API that can be used to access functionality.

Certain embodiments facilitate control of a local playback system from outside a household or other location at which the local playback network is configured. For example, a user can queue up music while away from his or her house. The application can facilitate setup and/or configuration. For example, a third party application may ask the user to enter a Sonos customer email address and password. The application can then make a request to a Sonos server in the cloud to determine the zone groups on which music can be played.

Various inventions have been described in sufficient detail with a certain degree of particularity. It is understood to those skilled in the art that the present disclosure of embodiments has been made by way of examples only and that numerous changes in the arrangement and combination of parts can be resorted without departing from the spirit and scope of the present disclosure as claimed. While the embodiments discussed herein can appear to include some limitations as to the presentation of the information units, in terms of the format and arrangement, the embodiments have applicability well beyond such embodiment, which can be appreciated by those skilled in the art. Accordingly, the scope of the present disclosure is defined by the appended claims rather than the forgoing description of embodiments.

The invention claimed is:

1. A computing device comprising:

at least one processor;

a non-transitory computer-readable medium; and

program instructions stored on the non-transitory computer-readable medium that, when executed by the at least one processor, cause the computing device to perform functions comprising:

operating in a first mode in which the computing device is configured for playback of a remote playback queue provided by a cloud-based computing system associated with a cloud-based media service;

while operating in the first mode, displaying a representation of one or more playback devices in a media playback system that are each i) communicatively coupled to the computing device over a data network and ii) available to accept playback responsibility for the remote playback queue;

while displaying the representation of the one or more playback devices, receiving user input indicating a selection of at least one given playback device from the one or more playback devices;

based on receiving the user input, transmitting an instruction for the at least one given playback device to take over responsibility for playback of the remote playback queue from the computing device, wherein the instruction configures the at least one given playback device to (i) communicate with the cloud-based computing system in order to obtain data identifying a next one or more media items that are in the remote playback queue, (ii) use the obtained data to retrieve at least one media item in the remote playback queue from the cloud-based media service; and (iii) play back the retrieved at least one media item;

detecting an indication that playback responsibility for the remote playback queue has been successfully

18

transferred from the computing device to the at least one given playback device; and

after detecting the indication, transitioning from i) the first mode in which the computing device is configured for playback of the remote playback queue to ii) a second mode in which the computing device is configured to control the at least one given playback device's playback of the remote playback queue and the computing device is no longer configured for playback of the remote playback queue.

2. The computing device of claim 1, wherein the instruction comprises an instruction for the cloud-based computing system associated with the media service to provide the data identifying the next one or more media items to the given playback device for use in retrieving the at least one media item from the cloud-based computing system associated with the cloud-based media service.

3. The computing device of claim 1, wherein the instruction comprises an instruction for the cloud-based computing system associated with the cloud-based media service to provide the at least one media item to the given playback device.

4. The computing device of claim 1, wherein the representation of the one or more playback devices comprises at least one selectable indicator for a group of playback devices that includes the given playback device and one or more other playback devices that are to be configured for synchronous playback of the remote playback queue, and wherein the user input indicating the selection of at least one given playback device from the one or more playback devices comprises user input indicating a selection of the group of playback devices.

5. The computing device of claim 1, wherein operating in a first mode in which the computing device is configured for playback of the remote playback queue comprises operating in the first mode in which the computing device has received user input indicating a selection of the remote playback queue for playback by the computing device but the computing device has not yet begun playback of the remote playback queue.

6. The computing device of claim 1, further comprising program instructions stored on the non-transitory computer-readable medium that, when executed by the at least one processor, cause the computing device to perform functions comprising:

beginning to operate in the first mode after i) launching a media application associated with the cloud-based media service and ii) receiving user input indicating a selection of the remote playback queue.

7. The computing device of claim 1, wherein:

operating in the first mode further involves providing a control interface comprising one or more selectable control icons that are configured to control playback of the remote playback queue by the computing device; transitioning from the first mode to the second mode further involves modifying the control interface such that the one or more selectable control icons are configured to control playback of the remote playback queue by the at least one playback device instead of the computing device.

8. The computing device of claim 7, further comprising program instructions stored on the non-transitory computer-readable medium that, when executed by the at least one processor, cause the computing device to perform functions comprising:

after transitioning to the second mode, receiving user input indicating a selection of a given control icon of

US 10,779,033 B2

19

the one or more selectable control icons, wherein the given control icon corresponds to a given transport control operation; and

based on receiving the user input indicating the selection of the given control icon, causing the corresponding transport control operation to be executed by the given playback device.

9. The computing device of claim 8, wherein the transport control operation comprises one of a play operation, a pause operation, a skip forward operation, or a skip back operation.

10. The computing device of claim 1, wherein the cloud-based computing system associated with the cloud-based media service includes one or more cloud servers.

11. The computing device of claim 1, wherein displaying the representation of the one or more playback devices comprises:

displaying the representation of the one or more playback devices in response to receiving a selection of a displayed icon indicating that playback responsibility for the remote playback queue can be transferred.

12. A non-transitory computer-readable medium having stored thereon program instructions that, when executed by at least one processor, cause a computing device to perform functions comprising:

operating in a first mode in which the computing device is configured for playback of a remote playback queue provided by a cloud-based computing system associated with a cloud-based media service;

while operating in the first mode, displaying a representation of one or more playback devices in a media playback system that are each i) communicatively coupled to the computing device over a data network and ii) available to accept playback responsibility for the remote playback queue;

while displaying the representation of the one or more playback devices, receiving user input indicating a selection of at least one given playback device from the one or more playback devices;

based on receiving the user input, transmitting an instruction for the at least one given playback device to take over responsibility for playback of the remote playback queue from the computing device, wherein the instruction configures the at least one given playback device to (i) communicate with the cloud-based computing system in order to obtain data identifying a next one or more media items that are in the remote playback queue, (ii) use the obtained data to retrieve at least one media item in the remote playback queue from the cloud-based media service; and (iii) play back the retrieved at least one media item;

detecting an indication that playback responsibility for the remote playback queue has been successfully transferred from the computing device to the at least one given playback device; and

after detecting the indication, transitioning from i) the first mode in which the computing device is configured for playback of the remote playback queue to ii) a second mode in which the computing device is configured to control the at least one given playback device's playback of the remote playback queue and the computing device is no longer configured for playback of the remote playback queue.

13. The non-transitory computer-readable medium of claim 12, wherein the instruction comprises an instruction

20

for the cloud-based computing system associated with the cloud-based media service to provide the data identifying the next one or more media items to the given playback device for use in obtaining the at least one media item from the cloud-based computing system associated with the cloud-based media service.

14. The non-transitory computer-readable medium of claim 12, wherein the instruction comprises an instruction for the cloud-based computing system associated with the media service to provide the at least one media item to the given playback device.

15. A method carried out by a computing device, the method comprising:

operating in a first mode in which the computing device is configured for playback of a remote playback queue provided by a cloud-based computing system associated with a cloud-based media service;

while operating in the first mode, displaying a representation of one or more playback devices in a media playback system that are each i) communicatively coupled to the computing device over a data network and ii) available to accept playback responsibility for the remote playback queue;

while displaying the representation of the one or more playback devices, receiving user input indicating a selection of at least one given playback device from the one or more playback devices;

based on receiving the user input, transmitting an instruction for the at least one given playback device to take over responsibility for playback of the remote playback queue from the computing device, wherein the instruction configures the at least one given playback device to (i) communicate with the cloud-based computing system in order to obtain data identifying a next one or more media items that are in the remote playback queue, (ii) use the obtained data to retrieve at least one media item in the remote playback queue from the cloud-based media service; and (iii) play back the retrieved at least one media item;

detecting an indication that playback responsibility for the remote playback queue has been successfully transferred from the computing device to the at least one given playback device; and

after detecting the indication, transitioning from i) the first mode in which the computing device is configured for playback of the remote playback queue to ii) a second mode in which the computing device is configured to control the at least one given playback device's playback of the remote playback queue and the computing device is no longer configured for playback of the remote playback queue.

16. The computing device of claim 1, further comprising program instructions stored on the non-transitory computer-readable medium that, when executed by the at least one processor, cause the computing device to perform functions comprising:

before displaying the representation of the one or more playback devices, receiving an indication that the one or more playback devices in the media playback system are available to accept playback responsibility for the remote playback queue.

* * * * *



US01046996B2

(12) **United States Patent**
Lambourne

(10) **Patent No.:** **US 10,469,966 B2**

(45) **Date of Patent:** **Nov. 5, 2019**

(54) **ZONE SCENE MANAGEMENT**

(56) **References Cited**

(71) Applicant: **SONOS, INC.**, Santa Barbara, CA (US)

U.S. PATENT DOCUMENTS

(72) Inventor: **Robert A. Lambourne**, Santa Barbara, CA (US)

3,956,591 A 5/1976 Gates, Jr.
4,105,974 A 8/1978 Rogers
(Continued)

(73) Assignee: **Sonos, Inc.**, Santa Barbara, CA (US)

FOREIGN PATENT DOCUMENTS

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

CA 2320451 A1 3/2001
CN 1598767 A 3/2005
(Continued)

(21) Appl. No.: **16/383,565**

OTHER PUBLICATIONS

(22) Filed: **Apr. 12, 2019**

Yamaha DME Designer 3.5 user manual (Year: 2004).
(Continued)

(65) **Prior Publication Data**

US 2019/0239009 A1 Aug. 1, 2019

Primary Examiner — Paul C McCord

Related U.S. Application Data

(63) Continuation of application No. 15/130,919, filed on Apr. 15, 2016, which is a continuation of application (Continued)

(51) **Int. Cl.**
G06F 17/00 (2019.01)
H04R 27/00 (2006.01)
(Continued)

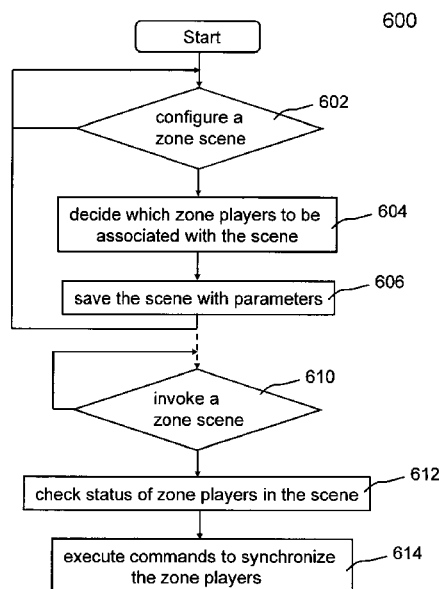
(52) **U.S. Cl.**
CPC **H04R 27/00** (2013.01); **G05B 15/02** (2013.01); **G06F 3/0482** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04R 27/00; H04R 3/12; H04R 2227/005;
H04R 2430/01; G05B 15/02;
(Continued)

(57) **ABSTRACT**

An example computing device in a media playback system receives a first request to create a first zone scene including a first preconfigured grouping of zones including a first zone and a second zone, and based on the first request, causes creation and storage of the first zone scene. The computing device receives a second request to create a second zone scene including a second preconfigured grouping of zones including the first zone and a third zone, and based on the second request, causes creation and storage of the second zone scene. While displaying a representation of the first zone scene and a representation of the second zone scene, the computing devices receives a third request to invoke the first zone scene, and based on the third request, causes the first zone scene to be invoked such that the first zone and the second zone become configured for synchronous playback of media.

20 Claims, 13 Drawing Sheets



US 10,469,966 B2

Page 2

Related U.S. Application Data

- No. 14/465,457, filed on Aug. 21, 2014, now Pat. No. 9,344,206, which is a continuation of application No. 13/896,829, filed on May 17, 2013, now Pat. No. 8,843,228, which is a continuation of application No. 11/853,790, filed on Sep. 11, 2007, now Pat. No. 8,483,853.
- (60) Provisional application No. 60/825,407, filed on Sep. 12, 2006.
- (51) **Int. Cl.**
G05B 15/02 (2006.01)
H04N 21/436 (2011.01)
H04R 3/12 (2006.01)
G06F 3/16 (2006.01)
H03G 7/00 (2006.01)
G06F 3/0482 (2013.01)
G06F 3/0484 (2013.01)
H03G 1/02 (2006.01)
H04H 60/80 (2008.01)
- (52) **U.S. Cl.**
CPC **G06F 3/0484** (2013.01); **G06F 3/16** (2013.01); **G06F 3/165** (2013.01); **H03G 1/02** (2013.01); **H03G 7/00** (2013.01); **H04H 60/80** (2013.01); **H04N 21/43615** (2013.01); **H04R 3/12** (2013.01); **H04R 2227/005** (2013.01); **H04R 2430/01** (2013.01)
- (58) **Field of Classification Search**
CPC G06F 3/0482; G06F 3/04842; G06F 3/16; G06F 3/165; H03G 1/02; H03G 7/00; H04H 60/80; H04N 21/43615
USPC 700/94
See application file for complete search history.
- (56) **References Cited**
U.S. PATENT DOCUMENTS
- | | | | |
|-----------|---|---------|-------------------|
| D260,764 | S | 9/1981 | Castagna et al. |
| 4,296,278 | A | 10/1981 | Cullison et al. |
| 4,306,114 | A | 12/1981 | Callahan |
| 4,382,158 | A | 5/1983 | Ohshita et al. |
| 4,509,211 | A | 4/1985 | Robbins |
| D279,779 | S | 7/1985 | Taylor |
| 4,530,091 | A | 7/1985 | Crockett |
| 4,696,037 | A | 9/1987 | Fierens |
| 4,701,629 | A | 10/1987 | Citroen |
| 4,712,105 | A | 12/1987 | Kohler |
| D293,671 | S | 1/1988 | Beaumont |
| 4,731,814 | A | 3/1988 | Becker et al. |
| 4,816,989 | A | 3/1989 | Finn et al. |
| 4,824,059 | A | 4/1989 | Butler |
| D301,037 | S | 5/1989 | Matsuda |
| 4,845,751 | A | 7/1989 | Schwab |
| D304,443 | S | 11/1989 | Grinyer et al. |
| D313,023 | S | 12/1990 | Kolenda et al. |
| D313,398 | S | 1/1991 | Gilchrist |
| D313,600 | S | 1/1991 | Weber |
| 4,994,908 | A | 2/1991 | Kuban et al. |
| 4,995,778 | A | 2/1991 | Bruessel |
| D320,598 | S | 10/1991 | Auerbach et al. |
| D322,609 | S | 12/1991 | Patton |
| 5,086,385 | A | 2/1992 | Launey et al. |
| D326,450 | S | 5/1992 | Watanabe |
| D327,060 | S | 6/1992 | Wachob et al. |
| 5,151,922 | A | 9/1992 | Weiss |
| 5,153,579 | A | 10/1992 | Fisch et al. |
| D331,388 | S | 12/1992 | Dahnert et al. |
| 5,182,552 | A | 1/1993 | Paynting |
| D333,135 | S | 2/1993 | Wachob et al. |
| 5,185,680 | A | 2/1993 | Kakubo |
| 5,237,327 | A | 8/1993 | Saitoh et al. |
| 5,239,458 | A | 8/1993 | Suzuki |
| 5,272,757 | A | 12/1993 | Scotfield et al. |
| 5,299,266 | A | 3/1994 | Lumsden |
| D350,531 | S | 9/1994 | Tsuji |
| D350,962 | S | 9/1994 | Reardon et al. |
| 5,361,381 | A | 11/1994 | Short |
| 5,372,441 | A | 12/1994 | Louis |
| D354,059 | S | 1/1995 | Hendricks |
| D354,751 | S | 1/1995 | Hersh et al. |
| D356,093 | S | 3/1995 | McCauley et al. |
| D356,312 | S | 3/1995 | Althans |
| D357,024 | S | 4/1995 | Tokiyama et al. |
| 5,406,634 | A | 4/1995 | Anderson et al. |
| 5,430,485 | A | 7/1995 | Lankford et al. |
| 5,440,644 | A | 8/1995 | Farinelli et al. |
| D362,446 | S | 9/1995 | Gasiorek et al. |
| 5,457,448 | A | 10/1995 | Totsuka et al. |
| D363,933 | S | 11/1995 | Starck |
| 5,467,342 | A | 11/1995 | Logston et al. |
| D364,877 | S | 12/1995 | Tokiyama et al. |
| D364,878 | S | 12/1995 | Green et al. |
| D365,102 | S | 12/1995 | Gioscia |
| D366,044 | S | 1/1996 | Hara et al. |
| 5,481,251 | A | 1/1996 | Buys et al. |
| 5,491,839 | A | 2/1996 | Schotz |
| 5,515,345 | A | 5/1996 | Barreira et al. |
| 5,519,641 | A | 5/1996 | Beers et al. |
| 5,533,021 | A | 7/1996 | Branstad et al. |
| D372,716 | S | 8/1996 | Thorne |
| 5,553,147 | A | 9/1996 | Pineau |
| 5,553,222 | A | 9/1996 | Milne et al. |
| 5,553,314 | A | 9/1996 | Grube et al. |
| D377,651 | S | 1/1997 | Biasotti et al. |
| 5,596,696 | A | 1/1997 | Tindell et al. |
| 5,602,992 | A | 2/1997 | Danneels |
| 5,623,483 | A | 4/1997 | Agrawal et al. |
| 5,625,350 | A | 4/1997 | Fukatsu et al. |
| D379,816 | S | 6/1997 | Laituri et al. |
| 5,640,388 | A | 6/1997 | Woodhead et al. |
| D380,752 | S | 7/1997 | Hanson |
| 5,652,749 | A | 7/1997 | Davenport et al. |
| D382,271 | S | 8/1997 | Akwivu |
| 5,661,665 | A | 8/1997 | Glass et al. |
| 5,668,884 | A | 9/1997 | Clair, Jr. et al. |
| 5,673,323 | A | 9/1997 | Schotz et al. |
| D384,940 | S | 10/1997 | Kono et al. |
| D387,352 | S | 12/1997 | Kaneko et al. |
| 5,696,896 | A | 12/1997 | Badovinatz et al. |
| D388,792 | S | 1/1998 | Nykerk |
| D389,143 | S | 1/1998 | Wicks |
| D392,641 | S | 3/1998 | Fenner |
| 5,726,989 | A | 3/1998 | Dokic |
| D393,628 | S | 4/1998 | Ledbetter et al. |
| 5,740,235 | A | 4/1998 | Lester et al. |
| 5,742,623 | A | 4/1998 | Nuber et al. |
| D394,659 | S | 5/1998 | Biasotti et al. |
| 5,751,819 | A | 5/1998 | Dorough |
| 5,761,320 | A | 6/1998 | Farinelli et al. |
| 5,774,016 | A | 6/1998 | Ketterer |
| D395,889 | S | 7/1998 | Gerba et al. |
| 5,787,249 | A | 7/1998 | Badovinatz et al. |
| 5,790,543 | A | 8/1998 | Cloutier |
| D397,996 | S | 9/1998 | Smith |
| 5,808,662 | A | 9/1998 | Kinney et al. |
| 5,812,201 | A | 9/1998 | Yoo |
| 5,815,689 | A | 9/1998 | Shaw et al. |
| 5,818,948 | A | 10/1998 | Gulick |
| D401,587 | S | 11/1998 | Rudolph |
| 5,832,024 | A | 11/1998 | Schotz et al. |
| 5,848,152 | A | 12/1998 | Slipy et al. |
| 5,852,722 | A | 12/1998 | Hamilton |
| D404,741 | S | 1/1999 | Schumaker et al. |
| D405,071 | S | 2/1999 | Gambaro |
| 5,867,691 | A | 2/1999 | Shiraishi |
| 5,875,233 | A | 2/1999 | Cox |
| 5,875,354 | A | 2/1999 | Charlton et al. |
| D406,847 | S | 3/1999 | Gerba et al. |

US 10,469,966 B2

Page 3

(56)

References Cited

U.S. PATENT DOCUMENTS

D407,071 S	3/1999	Keating	6,430,353 B1	8/2002	Honda et al.
5,887,143 A	3/1999	Saito et al.	6,442,443 B1	8/2002	Fujii et al.
5,905,768 A	5/1999	Maturi et al.	D462,339 S	9/2002	Allen et al.
D410,927 S	6/1999	Yamagishi	D462,340 S	9/2002	Allen et al.
5,910,991 A	6/1999	Farrar	D462,945 S	9/2002	Skulley
D412,337 S	7/1999	Hamano	6,449,642 B2	9/2002	Bourke-Dunphy et al.
5,923,869 A	7/1999	Kashiwagi et al.	6,449,653 B2	9/2002	Klemets et al.
5,923,902 A	7/1999	Inagaki	6,456,783 B1	9/2002	Ando et al.
5,946,343 A	8/1999	Schotz et al.	6,463,474 B1	10/2002	Fuh et al.
5,956,025 A	9/1999	Goulden et al.	6,466,832 B1	10/2002	Zuqert et al.
5,956,088 A	9/1999	Shen et al.	6,469,633 B1	10/2002	Wachter et al.
5,960,006 A	9/1999	Maturi et al.	D466,108 S	11/2002	Glodava et al.
D415,496 S	10/1999	Gerba et al.	6,487,296 B1	11/2002	Allen et al.
D416,021 S	11/1999	Godette et al.	6,493,832 B1	12/2002	Itakura et al.
5,984,512 A	11/1999	Jones et al.	D468,297 S	1/2003	Ikeda
5,987,611 A	11/1999	Freund	6,522,886 B1	2/2003	Youngs et al.
5,990,884 A	11/1999	Douma et al.	6,526,325 B1	2/2003	Sussman et al.
5,991,307 A	11/1999	Komuro et al.	6,535,121 B2	3/2003	Matheny et al.
5,999,906 A	12/1999	Merces et al.	D474,763 S	5/2003	Tozaki et al.
6,009,457 A	12/1999	Moller	D475,993 S	6/2003	Meyer
6,018,376 A	1/2000	Nakatani	D476,643 S	7/2003	Yamagishi
D420,006 S	2/2000	Tonino	D477,310 S	7/2003	Moransais
6,026,150 A	2/2000	Frank et al.	6,587,127 B1	7/2003	Leeke et al.
6,029,196 A	2/2000	Lenz	6,598,172 B1	7/2003	Vandeusen et al.
6,031,818 A	2/2000	Lo et al.	D478,051 S	8/2003	Sagawa
6,032,202 A	2/2000	Lea et al.	D478,069 S	8/2003	Beck et al.
6,038,614 A	3/2000	Chan et al.	D478,896 S	8/2003	Summers
6,046,550 A	4/2000	Ference et al.	6,604,023 B1	8/2003	Brown et al.
6,061,457 A	5/2000	Stockhamer	6,611,537 B1	8/2003	Edens et al.
6,078,725 A	6/2000	Tanaka	D479,520 S	9/2003	De
6,081,266 A	6/2000	Sciammarella	D481,056 S	10/2003	Kawasaki et al.
6,088,063 A	7/2000	Shiba	6,631,410 B1	10/2003	Kowalski et al.
D429,246 S	8/2000	Holma	6,636,269 B1	10/2003	Baldwin
D430,143 S	8/2000	Renk	6,653,899 B2	11/2003	Organvitez et al.
6,101,195 A	8/2000	Lyons et al.	6,654,720 B1	11/2003	Graham et al.
6,108,485 A	8/2000	Kim	6,654,956 B1	11/2003	Trinh et al.
6,108,686 A	8/2000	Williams, Jr.	6,658,091 B1	12/2003	Naidoo et al.
6,122,668 A	9/2000	Teng et al.	6,674,803 B1	1/2004	Kesselring
D431,552 S	10/2000	Backs et al.	6,684,060 B1	1/2004	Curtin
D432,525 S	10/2000	Beecroft	D486,145 S	2/2004	Kaminski et al.
6,127,941 A	10/2000	Van Ryzin	6,687,664 B1	2/2004	Sussman et al.
6,128,318 A	10/2000	Sato	6,704,421 B1	3/2004	Kitamura
6,148,205 A	11/2000	Cotton	6,741,961 B2	5/2004	Lim
6,157,957 A	12/2000	Berthaud	D491,925 S	6/2004	Griesau et al.
6,163,647 A	12/2000	Terashima et al.	6,757,517 B2	6/2004	Chang et al.
6,169,725 B1	1/2001	Gibbs et al.	D493,148 S	7/2004	Shibata et al.
6,175,872 B1	1/2001	Neumann et al.	6,763,274 B1	7/2004	Gilbert
6,181,383 B1	1/2001	Fox et al.	D495,333 S	8/2004	Borsboom
6,185,737 B1	2/2001	Northcutt et al.	6,778,073 B2	8/2004	Lutter et al.
6,195,435 B1	2/2001	Kitamura	6,778,493 B1	8/2004	Ishii
6,195,436 B1	2/2001	Scibora et al.	6,778,869 B2	8/2004	Champion
6,199,169 B1	3/2001	Voth	D496,003 S	9/2004	Spira
6,212,282 B1	4/2001	Mershon	D496,005 S	9/2004	Wang
6,246,701 B1	6/2001	Slattery	D496,335 S	9/2004	Spira
6,253,293 B1	6/2001	Rao et al.	D497,363 S	10/2004	Olson et al.
D444,475 S	7/2001	Levey et al.	6,803,964 B1	10/2004	Post et al.
6,255,961 B1	7/2001	Van et al.	6,809,635 B1	10/2004	Kaaresoja
6,256,554 B1	7/2001	Dilorenzo	D499,086 S	11/2004	Polito
6,269,406 B1	7/2001	Dutcher et al.	6,816,510 B1	11/2004	Banerjee
6,301,012 B1	10/2001	White et al.	6,816,818 B2	11/2004	Wolf et al.
6,308,207 B1	10/2001	Tseng et al.	6,823,225 B1	11/2004	Sass
6,310,652 B1	10/2001	Li et al.	6,826,283 B1	11/2004	Wheeler et al.
6,313,879 B1	11/2001	Kubo et al.	D499,395 S	12/2004	Hsu
6,321,252 B1	11/2001	Bhola et al.	D499,718 S	12/2004	Chen
6,324,586 B1	11/2001	Johnson	D500,015 S	12/2004	Gubbe
D452,520 S	12/2001	Gotham et al.	6,836,788 B2	12/2004	Kim et al.
6,332,147 B1	12/2001	Moran et al.	6,839,752 B1	1/2005	Miller et al.
6,343,028 B1	1/2002	Kuwaoka	D501,477 S	2/2005	Hall
6,349,285 B1	2/2002	Liu et al.	6,859,460 B1	2/2005	Chen
6,349,339 B1	2/2002	Williams	6,859,538 B1	2/2005	Voltz
6,351,821 B1	2/2002	Voth	6,873,862 B2	3/2005	Reshefsky
6,353,172 B1	3/2002	Fay et al.	6,882,335 B2	4/2005	Saarinan
6,356,871 B1	3/2002	Hemkumar et al.	D504,872 S	5/2005	Uehara et al.
6,404,811 B1	6/2002	Cvetko et al.	D504,885 S	5/2005	Zhang et al.
6,418,150 B1	7/2002	Staats	6,889,207 B2	5/2005	Slemmer et al.
			6,898,642 B2	5/2005	Chafle et al.
			6,901,439 B1	5/2005	Bonasia et al.
			D506,463 S	6/2005	Daniels
			6,907,458 B2	6/2005	Tomassetti et al.

US 10,469,966 B2

Page 4

(56)

References Cited

U.S. PATENT DOCUMENTS

6,912,610 B2	6/2005	Spencer	7,333,519 B2	2/2008	Sullivan et al.
6,915,347 B2	7/2005	Hanko et al.	7,346,332 B2	3/2008	McCarty et al.
6,916,980 B2	7/2005	Ishida et al.	7,356,011 B1	4/2008	Waters et al.
6,917,592 B1	7/2005	Ramankutty et al.	7,359,006 B1	4/2008	Xiang et al.
6,919,771 B2	7/2005	Nakajima	7,366,206 B2	4/2008	Lockridge et al.
6,920,373 B2	7/2005	Xi et al.	7,372,846 B2	5/2008	Zwack
6,931,134 B1	8/2005	Waller, Jr. et al.	7,391,791 B2	6/2008	Balassanian et al.
6,931,557 B2	8/2005	Togawa	7,392,102 B2	6/2008	Sullivan et al.
6,934,766 B1	8/2005	Russell	7,392,481 B2	6/2008	Gewickey et al.
6,937,988 B1	8/2005	Hemkumar et al.	7,400,644 B2	7/2008	Sakamoto et al.
6,970,482 B2	11/2005	Kim	7,412,499 B2	8/2008	Chang et al.
6,985,694 B1	1/2006	De Bonet et al.	7,424,267 B2	9/2008	Eisenbach
6,987,767 B2	1/2006	Saito	7,428,310 B2	9/2008	Park
6,987,947 B2	1/2006	Richenstein et al.	7,430,181 B1	9/2008	Hong
D515,072 S	2/2006	Lee	7,457,948 B1	11/2008	Bilicksa et al.
D515,557 S	2/2006	Okuley	7,472,058 B2	12/2008	Tseng et al.
7,007,106 B1	2/2006	Flood et al.	7,474,677 B2	1/2009	Trott
7,020,791 B1	3/2006	Aweya et al.	7,483,538 B2	1/2009	McCarty et al.
D518,475 S	4/2006	Yang et al.	7,483,540 B2	1/2009	Rabinowitz et al.
7,043,477 B2	5/2006	Mercer et al.	7,483,958 B1	1/2009	Elabbady et al.
7,043,651 B2	5/2006	Aweya et al.	7,490,044 B2	2/2009	Kulkarni
7,046,677 B2	5/2006	Monta et al.	7,492,912 B2	2/2009	Chung et al.
7,047,308 B2	5/2006	Deshpande	7,505,889 B2	3/2009	Salmonsens et al.
7,054,888 B2	5/2006	Lachapelle et al.	7,509,181 B2	3/2009	Champion
7,058,889 B2	6/2006	Trovato et al.	7,519,188 B2	4/2009	Berardi et al.
7,068,596 B1	6/2006	Mou	7,519,667 B1	4/2009	Capps
D524,296 S	7/2006	Kita	7,539,551 B2	5/2009	Komura et al.
7,072,477 B1	7/2006	Kincaid	7,548,744 B2	6/2009	Oesterling et al.
D527,375 S	8/2006	Flora et al.	7,548,851 B1	6/2009	Lau et al.
7,092,528 B2	8/2006	Patrick et al.	7,558,224 B1	7/2009	Surazski et al.
7,092,694 B2	8/2006	Griep et al.	7,558,635 B1	7/2009	Thiel et al.
7,096,169 B2	8/2006	Crutchfield et al.	7,561,932 B1	7/2009	Holmes et al.
7,113,999 B2	9/2006	Pestoni et al.	7,571,014 B1	8/2009	Lambourne et al.
7,115,017 B1	10/2006	Laursen et al.	7,574,274 B2	8/2009	Holmes
7,120,168 B2	10/2006	Zimmermann	7,599,685 B2	10/2009	Goldberg et al.
7,130,316 B2	10/2006	Kovacevic	7,606,174 B2	10/2009	Ochi et al.
7,130,368 B1	10/2006	Aweya et al.	7,620,468 B2	11/2009	Shimizu
7,130,608 B2	10/2006	Hollstrom et al.	7,626,952 B2	12/2009	Slemmer et al.
7,130,616 B2	10/2006	Janik	7,627,825 B2	12/2009	Kakuda
7,136,934 B2	11/2006	Carter et al.	7,630,500 B1	12/2009	Beckman et al.
7,139,981 B2	11/2006	Mayer et al.	7,630,501 B2	12/2009	Blank et al.
7,143,141 B1	11/2006	Morgan et al.	7,631,119 B2	12/2009	Moore et al.
7,143,939 B2	12/2006	Henzerling	7,643,894 B2	1/2010	Braithwaite et al.
7,146,260 B2	12/2006	Preston et al.	7,653,344 B1	1/2010	Feldman et al.
7,158,488 B2	1/2007	Fujimori	7,657,224 B2	2/2010	Goldberg et al.
7,161,939 B2	1/2007	Israel et al.	7,657,644 B1	2/2010	Zheng
7,162,315 B2	1/2007	Gilbert	7,657,910 B1	2/2010	McAulay et al.
7,171,010 B2	1/2007	Martin et al.	7,665,115 B2	2/2010	Gallo et al.
7,185,090 B2	2/2007	Kowalski et al.	7,668,990 B2	2/2010	Krzyzanowski et al.
7,187,947 B1	3/2007	White et al.	7,669,113 B1	2/2010	Moore et al.
7,197,148 B2	3/2007	Nourse et al.	7,669,219 B2	2/2010	Scott, III
7,206,367 B1	4/2007	Moore et al.	7,672,470 B2	3/2010	Lee
7,206,618 B2	4/2007	Latto et al.	7,675,943 B2	3/2010	Mosig et al.
7,206,967 B1	4/2007	Marti et al.	7,676,044 B2	3/2010	Sasaki et al.
7,209,795 B2	4/2007	Sullivan et al.	7,676,142 B1	3/2010	Hung
7,218,708 B2	5/2007	Berezowski	7,688,306 B2	3/2010	Wehrenberg et al.
7,236,739 B2	6/2007	Chang et al.	7,689,304 B2	3/2010	Sasaki
7,236,773 B2	6/2007	Thomas	7,689,305 B2	3/2010	Kreifeldt et al.
7,257,398 B1	8/2007	Ukita et al.	7,702,279 B2	4/2010	Ko et al.
7,260,616 B1	8/2007	Cook	7,702,403 B1	4/2010	Gladwin et al.
7,263,110 B2	8/2007	Fujishiro	7,710,941 B2	5/2010	Rietschel et al.
7,277,547 B1	10/2007	Delker et al.	7,711,774 B1	5/2010	Rothschild
7,286,652 B1	10/2007	Azriel et al.	7,720,096 B2	5/2010	Klemets
7,289,631 B2	10/2007	Ishidoshiro	7,721,032 B2	5/2010	Bushell et al.
7,293,060 B2	11/2007	Komsi	7,742,740 B2	6/2010	Goldberg et al.
7,295,548 B2	11/2007	Blank et al.	7,742,832 B1	6/2010	Feldman et al.
7,302,468 B2	11/2007	Wijeratne	7,743,009 B2	6/2010	Hangartner et al.
7,305,694 B2	12/2007	Commons et al.	7,746,906 B2	6/2010	Jinzaki et al.
7,308,188 B2	12/2007	Namatame	7,761,176 B2	7/2010	Ben-Yaacov et al.
7,310,334 B1	12/2007	Fitzgerald et al.	7,765,315 B2	7/2010	Batson et al.
7,312,785 B2	12/2007	Tsuk et al.	RE41,608 E	8/2010	Blair et al.
7,313,593 B1	12/2007	Pulito et al.	7,792,311 B1	9/2010	Holmgren et al.
7,319,764 B1	1/2008	Reid et al.	7,793,206 B2	9/2010	Lim et al.
7,324,857 B2	1/2008	Goddard	7,804,972 B2	9/2010	Melanson
7,330,875 B1	2/2008	Parasnis et al.	7,805,210 B2	9/2010	Cucos et al.
			7,817,960 B2	10/2010	Tan et al.
			7,827,259 B2	11/2010	Heller et al.
			7,831,054 B2	11/2010	Ball et al.
			7,835,689 B2	11/2010	Goldberg et al.

US 10,469,966 B2

Page 5

(56)

References Cited

U.S. PATENT DOCUMENTS

7,849,181 B2	12/2010	Slemmer et al.	8,265,310 B2	9/2012	Berardi et al.
7,853,341 B2	12/2010	McCarty et al.	8,279,709 B2	10/2012	Choisel et al.
7,865,137 B2	1/2011	Goldberg et al.	8,281,001 B2	10/2012	Busam et al.
7,882,234 B2	2/2011	Watanabe et al.	8,285,404 B1	10/2012	Kekki
7,885,622 B2	2/2011	Krampf et al.	8,290,185 B2	10/2012	Kim
7,907,819 B2	3/2011	Ando et al.	8,290,603 B1	10/2012	Lambourne et al.
7,916,877 B2	3/2011	Goldberg et al.	8,300,845 B2	10/2012	Zurek et al.
7,917,082 B2	3/2011	Goldberg et al.	8,306,235 B2	11/2012	Mahowald
7,933,418 B2	4/2011	Morishima	8,311,226 B2	11/2012	Lorgeoux et al.
7,934,239 B1	4/2011	Dagman	8,315,555 B2	11/2012	Ko et al.
7,945,636 B2	5/2011	Nelson et al.	8,316,147 B2	11/2012	Batson et al.
7,945,708 B2	5/2011	Ohkita	8,325,931 B2	12/2012	Howard et al.
7,958,441 B2	6/2011	Heller et al.	8,325,935 B2	12/2012	Rutschman
7,962,482 B2	6/2011	Handman et al.	8,331,585 B2	12/2012	Hagen et al.
7,966,388 B1	6/2011	Pugaczewski et al.	8,340,330 B2	12/2012	Yoon et al.
7,987,294 B2	7/2011	Bryce et al.	8,345,709 B2	1/2013	Nitzpon et al.
7,995,732 B2	8/2011	Koch et al.	8,364,295 B2	1/2013	Beckmann et al.
7,996,566 B1	8/2011	Sylvain et al.	8,370,678 B2	2/2013	Millington et al.
7,996,588 B2	8/2011	Subbiah et al.	8,374,595 B2	2/2013	Chien et al.
8,014,423 B2	9/2011	Thaler et al.	8,391,501 B2	3/2013	Khawand et al.
8,015,306 B2	9/2011	Bowman	8,407,623 B2	3/2013	Kerr et al.
8,020,023 B2	9/2011	Millington et al.	8,411,883 B2	4/2013	Matsumoto
8,023,663 B2	9/2011	Goldberg	8,423,659 B2	4/2013	Millington
8,028,038 B2	9/2011	Weel	8,423,893 B2	4/2013	Ramsay et al.
8,028,323 B2	9/2011	Weel	8,432,851 B2	4/2013	Xu et al.
8,041,062 B2	10/2011	Cohen et al.	8,433,076 B2	4/2013	Zurek et al.
8,045,721 B2	10/2011	Burgan et al.	8,442,239 B2	5/2013	Bruelle-Drews et al.
8,045,952 B2	10/2011	Qureshey et al.	8,452,020 B2	5/2013	Gregg et al.
8,050,203 B2	11/2011	Jacobsen et al.	8,457,334 B2	6/2013	Yoon et al.
8,050,652 B2	11/2011	Qureshey et al.	8,463,184 B2	6/2013	Dua
8,054,987 B2	11/2011	Seydoux	8,463,875 B2	6/2013	Katz et al.
8,055,364 B2	11/2011	Champion	8,473,844 B2	6/2013	Kreifeldt et al.
8,063,698 B2	11/2011	Howard	8,477,958 B2	7/2013	Moeller et al.
8,074,253 B1	12/2011	Nathan	8,483,853 B1	7/2013	Lambourne et al.
8,086,287 B2	12/2011	Mooney et al.	8,498,726 B2	7/2013	Kim et al.
8,086,752 B2	12/2011	Millington et al.	8,509,211 B2	8/2013	Trotter et al.
8,090,317 B2	1/2012	Burge et al.	8,520,870 B2	8/2013	Sato et al.
8,103,009 B2	1/2012	McCarty et al.	8,565,455 B2	10/2013	Worrell et al.
8,111,132 B2	2/2012	Allen et al.	8,577,045 B2	11/2013	Gibbs
8,112,032 B2	2/2012	Ko et al.	8,577,048 B2	11/2013	Chaikin et al.
8,116,476 B2	2/2012	Inohara	8,588,432 B1	11/2013	Simon
8,126,172 B2	2/2012	Horbach et al.	8,588,949 B2	11/2013	Lambourne et al.
8,131,389 B1	3/2012	Hardwick et al.	8,600,075 B2	12/2013	Lim
8,131,390 B2	3/2012	Braithwaite et al.	8,600,084 B1	12/2013	Garrett
8,135,141 B2	3/2012	Shiba	8,611,559 B2	12/2013	Sanders
8,139,774 B2	3/2012	Berardi et al.	8,615,091 B2	12/2013	Terwal
8,144,883 B2	3/2012	Pdersen et al.	8,620,006 B2	12/2013	Berardi et al.
8,148,622 B2	4/2012	Rothkopf et al.	8,639,830 B2	1/2014	Bowman
8,150,079 B2	4/2012	Maeda et al.	8,654,995 B2	2/2014	Silber et al.
8,160,281 B2	4/2012	Kim et al.	8,672,744 B1	3/2014	Gronkowski et al.
8,169,938 B2	5/2012	Duchscher et al.	8,683,009 B2	3/2014	Ng et al.
8,170,222 B2	5/2012	Dunko	8,700,730 B2	4/2014	Rowe
8,170,260 B2	5/2012	Reining et al.	8,731,206 B1	5/2014	Park
8,175,292 B2	5/2012	Aylward et al.	8,750,282 B2	6/2014	Gelter et al.
8,175,297 B1	5/2012	Ho et al.	8,751,026 B2	6/2014	Sato et al.
8,185,674 B2	5/2012	Moore et al.	8,762,565 B2	6/2014	Togashi et al.
8,189,824 B2	5/2012	Strauss et al.	8,775,546 B2	7/2014	Millington
8,194,874 B2	6/2012	Starobin et al.	8,788,080 B1	7/2014	Kallai et al.
8,204,890 B1	6/2012	Gogan et al.	8,818,538 B2	8/2014	Sakata
8,208,653 B2	6/2012	Eo et al.	8,819,554 B2	8/2014	Basso et al.
8,214,447 B2	7/2012	Deslippe et al.	8,843,224 B2	9/2014	Holmgren et al.
8,214,740 B2	7/2012	Johnson	8,843,228 B2	9/2014	Lambourne
8,214,873 B2	7/2012	Weel	8,843,586 B2	9/2014	Pantos et al.
8,218,790 B2	7/2012	Bull et al.	8,855,319 B2	10/2014	Liu et al.
8,229,125 B2	7/2012	Short	8,861,739 B2	10/2014	Ojanpera
8,230,099 B2	7/2012	Weel	8,879,761 B2	11/2014	Johnson et al.
8,233,029 B2	7/2012	Yoshida et al.	8,885,851 B2	11/2014	Westenbroek
8,233,632 B1	7/2012	MacDonald et al.	8,886,347 B2	11/2014	Lambourne
8,233,635 B2	7/2012	Shiba	8,904,066 B2	12/2014	Moore et al.
8,233,648 B2	7/2012	Sorek et al.	8,914,559 B2	12/2014	Kalayjian et al.
8,234,395 B2	7/2012	Millington et al.	8,917,877 B2	12/2014	Haaff et al.
8,238,578 B2	8/2012	Aylward	8,923,997 B2	12/2014	Kallai et al.
8,239,559 B2	8/2012	Rajapakse	8,930,006 B2	1/2015	Haatainen
8,239,748 B1	8/2012	Moore et al.	8,934,647 B2	1/2015	Joyce et al.
8,243,961 B1	8/2012	Morrill	8,934,655 B2	1/2015	Breen et al.
			8,942,252 B2	1/2015	Balassanian et al.
			8,942,395 B2	1/2015	Lissaman et al.
			8,954,177 B2	2/2015	Sanders
			8,965,544 B2	2/2015	Ramsay

US 10,469,966 B2

Page 6

(56)

References Cited

U.S. PATENT DOCUMENTS

8,965,546 B2	2/2015	Visser et al.	2003/0002689 A1	1/2003	Folio
8,966,394 B2	2/2015	Gates et al.	2003/0008616 A1	1/2003	Anderson
8,977,974 B2	3/2015	Kraut	2003/0014486 A1	1/2003	May
8,984,442 B2	3/2015	Pirnack et al.	2003/0018797 A1	1/2003	Dunning et al.
9,020,153 B2	4/2015	Britt, Jr.	2003/0020763 A1	1/2003	Mayer et al.
9,042,556 B2	5/2015	Kallai et al.	2003/0023741 A1	1/2003	Tomassetti et al.
9,112,622 B2	8/2015	Miyata et al.	2003/0031333 A1	2/2003	Cohen et al.
9,137,602 B2	9/2015	Mayman et al.	2003/0035072 A1	2/2003	Hagg
9,160,965 B2	10/2015	Redmann et al.	2003/0035444 A1	2/2003	Zwack
9,195,258 B2	11/2015	Millington	2003/0041173 A1	2/2003	Hoyle
9,219,959 B2	12/2015	Kallai et al.	2003/0041174 A1	2/2003	Wen et al.
9,226,073 B2	12/2015	Ramos et al.	2003/0043856 A1	3/2003	Lakaniemi et al.
9,245,514 B2	1/2016	Donaldson	2003/0043924 A1	3/2003	Haddad et al.
9,325,286 B1	4/2016	Yang	2003/0055892 A1	3/2003	Huitema et al.
9,524,098 B2	12/2016	Griffiths et al.	2003/0061428 A1	3/2003	Garney et al.
2001/0001160 A1	5/2001	Shoff et al.	2003/0063755 A1	4/2003	Nourse et al.
2001/0009604 A1	7/2001	Ando et al.	2003/0066094 A1	4/2003	Van Der Schaar et al.
2001/0022823 A1	9/2001	Renaud	2003/0067437 A1	4/2003	McClintock et al.
2001/0027498 A1	10/2001	Van De Meulenhof et al.	2003/0073432 A1	4/2003	Meade
2001/0032188 A1	10/2001	Miyabe et al.	2003/0091322 A1	5/2003	Van
2001/0042107 A1	11/2001	Palm	2003/0097478 A1	5/2003	King
2001/0043456 A1	11/2001	Atkinson	2003/0099212 A1	5/2003	Anjum et al.
2001/0046235 A1	11/2001	Trevitt et al.	2003/0099221 A1	5/2003	Rhee
2001/0047377 A1	11/2001	Sincaglia et al.	2003/0101253 A1	5/2003	Saito et al.
2001/0050991 A1	12/2001	Eves	2003/0103088 A1	6/2003	Dresti et al.
2002/0002039 A1	1/2002	Qureshey et al.	2003/0110329 A1	6/2003	Higaki et al.
2002/0002562 A1	1/2002	Moran et al.	2003/0126211 A1	7/2003	Anttila et al.
2002/0002565 A1	1/2002	Ohyama	2003/0135822 A1	7/2003	Evans
2002/0003548 A1	1/2002	Krusche et al.	2003/0157951 A1	8/2003	Hasty
2002/0022453 A1	2/2002	Balog et al.	2003/0161479 A1	8/2003	Yang et al.
2002/0026442 A1	2/2002	Lipscomb et al.	2003/0167335 A1	9/2003	Alexander
2002/0034374 A1	3/2002	Barton	2003/0172123 A1	9/2003	Polan et al.
2002/0042844 A1	4/2002	Chiazzese	2003/0177889 A1	9/2003	Koseki et al.
2002/0049843 A1	4/2002	Barone et al.	2003/0179780 A1	9/2003	Walker et al.
2002/0062406 A1	5/2002	Chang et al.	2003/0185400 A1	10/2003	Yoshizawa et al.
2002/0065926 A1	5/2002	Hackney et al.	2003/0195964 A1	10/2003	Mane
2002/0067909 A1	6/2002	Iivonen	2003/0198254 A1	10/2003	Sullivan et al.
2002/0072816 A1	6/2002	Shdema et al.	2003/0198255 A1	10/2003	Sullivan et al.
2002/0072817 A1	6/2002	Champion	2003/0198257 A1	10/2003	Sullivan et al.
2002/0073228 A1	6/2002	Cognet et al.	2003/0200001 A1	10/2003	Goddard et al.
2002/0078161 A1	6/2002	Cheng	2003/0204273 A1	10/2003	Dinker et al.
2002/0078293 A1	6/2002	Kou et al.	2003/0204509 A1	10/2003	Dinker et al.
2002/0080783 A1	6/2002	Fujimori et al.	2003/0210796 A1	11/2003	McCarty et al.
2002/0090914 A1	7/2002	Kang et al.	2003/0212802 A1	11/2003	Rector et al.
2002/0093478 A1	7/2002	Yeh	2003/0219007 A1	11/2003	Barrack et al.
2002/0095460 A1	7/2002	Benson	2003/0227478 A1	12/2003	Chatfield
2002/0098878 A1	7/2002	Mooney et al.	2003/0229900 A1	12/2003	Reisman
2002/0101357 A1	8/2002	Gharapetian	2003/0231208 A1	12/2003	Hanon et al.
2002/0103635 A1	8/2002	Mesarovic	2003/0231871 A1	12/2003	Ushimaru
2002/0109710 A1	8/2002	Holtz et al.	2003/0235304 A1	12/2003	Evans et al.
2002/0112244 A1	8/2002	Liou et al.	2004/0001106 A1	1/2004	Deutscher et al.
2002/0114354 A1	8/2002	Sinha et al.	2004/0001484 A1	1/2004	Ozguner
2002/0114359 A1	8/2002	Ibaraki et al.	2004/0001591 A1	1/2004	Mani et al.
2002/0124097 A1	9/2002	Isely et al.	2004/0008852 A1	1/2004	Also et al.
2002/0129156 A1	9/2002	Yoshikawa	2004/0010727 A1	1/2004	Fujinami
2002/0131398 A1	9/2002	Taylor	2004/0012620 A1	1/2004	Buhler et al.
2002/0131761 A1	9/2002	Kawasaki et al.	2004/0014426 A1	1/2004	Moore
2002/0136335 A1	9/2002	Liou et al.	2004/0015252 A1	1/2004	Aiso et al.
2002/0137505 A1	9/2002	Eiche et al.	2004/0019497 A1	1/2004	Volk et al.
2002/0143547 A1	10/2002	Fay et al.	2004/0019807 A1	1/2004	Freund et al.
2002/0143998 A1	10/2002	Rajagopal et al.	2004/0019911 A1	1/2004	Gates et al.
2002/0150053 A1	10/2002	Gray et al.	2004/0023697 A1	2/2004	Komura
2002/0159596 A1	10/2002	Durand et al.	2004/0024478 A1	2/2004	Hans et al.
2002/0163361 A1	11/2002	Parkin	2004/0024925 A1	2/2004	Cypher et al.
2002/0165721 A1	11/2002	Chang et al.	2004/0027166 A1	2/2004	Mangum et al.
2002/0165921 A1	11/2002	Sapieyevski	2004/0032348 A1	2/2004	Lai et al.
2002/0168938 A1	11/2002	Chang	2004/0032421 A1	2/2004	Williamson et al.
2002/0173273 A1	11/2002	Spurgat et al.	2004/0037433 A1	2/2004	Chen
2002/0177411 A1	11/2002	Yajima et al.	2004/0041836 A1	3/2004	Zaner et al.
2002/0181355 A1	12/2002	Shikunami et al.	2004/0042629 A1	3/2004	Mellone et al.
2002/0184310 A1	12/2002	Traversat et al.	2004/0044742 A1	3/2004	Evron et al.
2002/0188762 A1	12/2002	Tomassetti et al.	2004/0048569 A1	3/2004	Kawamura
2002/0194309 A1	12/2002	Carter et al.	2004/0059842 A1	3/2004	Hanson et al.
2002/0196951 A1	12/2002	Tsai	2004/0059965 A1	3/2004	Marshall et al.
2003/0002609 A1	1/2003	Faller et al.	2004/0066736 A1	4/2004	Kroeger
			2004/0071299 A1	4/2004	Yoshino
			2004/0075767 A1	4/2004	Neuman et al.
			2004/0078383 A1	4/2004	Mercer et al.
			2004/0080671 A1	4/2004	Siemens et al.

US 10,469,966 B2

Page 7

(56)

References Cited

U.S. PATENT DOCUMENTS

2004/0093096	A1	5/2004	Huang et al.	2005/0216556	A1	9/2005	Manion et al.
2004/0098754	A1	5/2004	Vella et al.	2005/0254505	A1	11/2005	Chang et al.
2004/0111473	A1	6/2004	Lysenko et al.	2005/0262217	A1	11/2005	Nonaka et al.
2004/0114771	A1	6/2004	Vaughan et al.	2005/0266798	A1	12/2005	Moloney et al.
2004/0117044	A1	6/2004	Konetski	2005/0266826	A1	12/2005	Vlad
2004/0117462	A1	6/2004	Bodin et al.	2005/0281255	A1	12/2005	Davies et al.
2004/0128701	A1	7/2004	Kaneko et al.	2005/0283820	A1	12/2005	Richards et al.
2004/0131192	A1	7/2004	Metcalf	2005/0288805	A1	12/2005	Moore et al.
2004/0133689	A1	7/2004	Vasisht	2005/0289224	A1	12/2005	Deslippe et al.
2004/0143368	A1	7/2004	May et al.	2005/0289244	A1	12/2005	Sahu et al.
2004/0143852	A1	7/2004	Meyers	2006/0041616	A1	2/2006	Ludwig et al.
2004/0147224	A1	7/2004	Lee	2006/0041639	A1	2/2006	Lamkin et al.
2004/0148237	A1	7/2004	Bittmann et al.	2006/0045281	A1	3/2006	Korneluk et al.
2004/0168081	A1	8/2004	Ladas et al.	2006/0072489	A1	4/2006	Toyoshima
2004/0170383	A1	9/2004	Mazur	2006/0095516	A1	5/2006	Wijeratne
2004/0171346	A1	9/2004	Lin	2006/0098936	A1	5/2006	Ikeda et al.
2004/0177167	A1	9/2004	Iwamura et al.	2006/0119497	A1	6/2006	Miller et al.
2004/0179554	A1	9/2004	Tsao	2006/0143236	A1	6/2006	Wu
2004/0183827	A1	9/2004	Putterman et al.	2006/0149402	A1	7/2006	Chung
2004/0185773	A1	9/2004	Gerber et al.	2006/0155721	A1	7/2006	Grunwald et al.
2004/0203354	A1	10/2004	Yue	2006/0173844	A1	8/2006	Zhang et al.
2004/0203378	A1	10/2004	Powers	2006/0179160	A1	8/2006	Uehara et al.
2004/0203590	A1	10/2004	Shteyn	2006/0193454	A1	8/2006	Abou-Chakra et al.
2004/0208158	A1	10/2004	Fellman et al.	2006/0193482	A1	8/2006	Harvey et al.
2004/0213230	A1	10/2004	Douskalis et al.	2006/0199538	A1	9/2006	Eisenbach
2004/0220687	A1	11/2004	Klotz et al.	2006/0205349	A1	9/2006	Passier et al.
2004/0223622	A1	11/2004	Lindemann et al.	2006/0222186	A1	10/2006	Paige et al.
2004/0224638	A1	11/2004	Fadell et al.	2006/0227985	A1	10/2006	Kawanami
2004/0225389	A1	11/2004	Ledoux et al.	2006/0229752	A1	10/2006	Chung
2004/0228367	A1	11/2004	Mosig et al.	2006/0259649	A1	11/2006	Hsieh et al.
2004/0248601	A1	12/2004	Chang	2006/0270395	A1	11/2006	Dhawan et al.
2004/0249490	A1	12/2004	Sakai	2006/0294569	A1	12/2006	Chung
2004/0249965	A1	12/2004	Huggins et al.	2007/0003067	A1	1/2007	Gierl et al.
2004/0249982	A1	12/2004	Arnold et al.	2007/0003075	A1	1/2007	Cooper et al.
2004/0252400	A1	12/2004	Blank et al.	2007/0022207	A1	1/2007	Millington et al.
2004/0253969	A1	12/2004	Nguyen et al.	2007/0038999	A1	2/2007	Millington et al.
2004/0264717	A1	12/2004	Fujita et al.	2007/0043847	A1	2/2007	Carter et al.
2005/0002535	A1	1/2005	Liu et al.	2007/0047712	A1	3/2007	Gross et al.
2005/0010691	A1	1/2005	Oyadomari et al.	2007/0048713	A1	3/2007	Plastina et al.
2005/0011388	A1	1/2005	Kouznetsov	2007/0054680	A1	3/2007	Mo et al.
2005/0013394	A1	1/2005	Rausch et al.	2007/0071255	A1	3/2007	Schobben
2005/0015551	A1	1/2005	Eames et al.	2007/0087686	A1	4/2007	Holm et al.
2005/0021470	A1	1/2005	Martin et al.	2007/0142022	A1	6/2007	Madonna et al.
2005/0021590	A1	1/2005	Debique et al.	2007/0142944	A1	6/2007	Goldberg et al.
2005/0027821	A1	2/2005	Alexander et al.	2007/0143493	A1	6/2007	Mullig et al.
2005/0031135	A1	2/2005	Devantier et al.	2007/0169115	A1	7/2007	Ko et al.
2005/0047605	A1	3/2005	Lee et al.	2007/0180137	A1	8/2007	Rajapakse
2005/0058149	A1	3/2005	Howe	2007/0189544	A1	8/2007	Rosenberg
2005/0060435	A1	3/2005	Xue et al.	2007/0192156	A1	8/2007	Gauger
2005/0062637	A1	3/2005	El Zabadani et al.	2007/0206829	A1	9/2007	Weinans et al.
2005/0069153	A1	3/2005	Hall et al.	2007/0223725	A1	9/2007	Neumann et al.
2005/0081213	A1	4/2005	Suzuoki et al.	2007/0249295	A1	10/2007	Ukita et al.
2005/0100174	A1	5/2005	Howard et al.	2007/0265031	A1	11/2007	Koizumi et al.
2005/0105052	A1	5/2005	McCormick et al.	2007/0271388	A1	11/2007	Bowra et al.
2005/0114538	A1	5/2005	Rose	2007/0288610	A1	12/2007	Saint et al.
2005/0120128	A1	6/2005	Willes et al.	2007/0299778	A1	12/2007	Haveson et al.
2005/0125222	A1	6/2005	Brown et al.	2008/0002836	A1	1/2008	Moeller et al.
2005/0125357	A1	6/2005	Saadat et al.	2008/0007649	A1	1/2008	Bennett
2005/0131558	A1	6/2005	Braithwaite et al.	2008/0007650	A1	1/2008	Bennett
2005/0144284	A1	6/2005	Ludwig et al.	2008/0007651	A1	1/2008	Bennett
2005/0147261	A1	7/2005	Yeh	2008/0018785	A1	1/2008	Bennett
2005/0154766	A1	7/2005	Huang et al.	2008/0022320	A1	1/2008	Ver Steeg
2005/0159833	A1	7/2005	Giaimo et al.	2008/0025535	A1	1/2008	Rajapakse
2005/0160270	A1	7/2005	Goldberg et al.	2008/0045140	A1	2/2008	Korhonen et al.
2005/0166135	A1	7/2005	Burke et al.	2008/0065232	A1	3/2008	Igoe
2005/0168630	A1	8/2005	Yamada et al.	2008/0066094	A1	3/2008	Igoe
2005/0177256	A1	8/2005	Shintani et al.	2008/0066120	A1	3/2008	Igoe
2005/0177643	A1	8/2005	Xu	2008/0072816	A1	3/2008	Riess et al.
2005/0181348	A1	8/2005	Carey et al.	2008/0075295	A1	3/2008	Mayman et al.
2005/0195205	A1	9/2005	Abrams, Jr.	2008/0077261	A1	3/2008	Baudino et al.
2005/0195823	A1	9/2005	Chen et al.	2008/0077619	A1	3/2008	Gilley et al.
2005/0195999	A1	9/2005	Takemura et al.	2008/0077620	A1	3/2008	Gilley et al.
2005/0197725	A1	9/2005	Alexander et al.	2008/0086318	A1	4/2008	Gilley et al.
2005/0198574	A1	9/2005	Lamkin et al.	2008/0091771	A1	4/2008	Allen et al.
2005/0201549	A1	9/2005	Dedieu et al.	2008/0092204	A1	4/2008	Bryce et al.
				2008/0120429	A1	5/2008	Millington et al.
				2008/0126943	A1	5/2008	Parasnis et al.
				2008/0144861	A1	6/2008	Melanson et al.
				2008/0144864	A1	6/2008	Huon et al.

US 10,469,966 B2

Page 8

(56)

References Cited

U.S. PATENT DOCUMENTS

2008/0146289	A1	6/2008	Korneluk et al.	2013/0041954	A1	2/2013	Kim et al.
2008/0152165	A1	6/2008	Zacchi	2013/0047084	A1	2/2013	Sanders et al.
2008/0159545	A1	7/2008	Takumai et al.	2013/0051572	A1	2/2013	Goh et al.
2008/0162668	A1	7/2008	Miller	2013/0052940	A1	2/2013	Brillhart et al.
2008/0189272	A1	8/2008	Powers et al.	2013/0070093	A1	3/2013	Rivera et al.
2008/0205070	A1	8/2008	Osada	2013/0080599	A1	3/2013	Ko et al.
2008/0212786	A1	9/2008	Park	2013/0094670	A1	4/2013	Millington
2008/0215169	A1	9/2008	Debettencourt et al.	2013/0124664	A1	5/2013	Fonseca, Jr. et al.
2008/0242222	A1	10/2008	Bryce et al.	2013/0129122	A1	5/2013	Johnson et al.
2008/0247554	A1	10/2008	Caffrey	2013/0132837	A1	5/2013	Mead et al.
2008/0263010	A1	10/2008	Roychoudhuri et al.	2013/0159126	A1	6/2013	Elkady
2008/0291863	A1	11/2008	Agren	2013/0167029	A1	6/2013	Friesen et al.
2008/0303947	A1	12/2008	Ohnishi et al.	2013/0174100	A1	7/2013	Seymour et al.
2009/0011798	A1	1/2009	Yamada	2013/0174223	A1	7/2013	Dykeman et al.
2009/0017868	A1	1/2009	Ueda et al.	2013/0179163	A1	7/2013	Herbig et al.
2009/0031336	A1	1/2009	Chavez et al.	2013/0191454	A1	7/2013	Oliver et al.
2009/0060219	A1	3/2009	Inohara	2013/0197682	A1	8/2013	Millington
2009/0070434	A1	3/2009	Himmelstein	2013/0208911	A1	8/2013	Millington
2009/0089327	A1	4/2009	Kalaboukis et al.	2013/0208921	A1	8/2013	Millington
2009/0097672	A1	4/2009	Buil et al.	2013/0226323	A1	8/2013	Millington
2009/0100189	A1	4/2009	Bahren et al.	2013/0230175	A1	9/2013	Bech et al.
2009/0124289	A1	5/2009	Nishida	2013/0232416	A1	9/2013	Millington
2009/0157905	A1	6/2009	Davis	2013/0236029	A1	9/2013	Millington
2009/0164655	A1	6/2009	Pettersson et al.	2013/0243199	A1	9/2013	Kallai et al.
2009/0169030	A1	7/2009	Inohara	2013/0253679	A1	9/2013	Lambourne
2009/0180632	A1	7/2009	Goldberg et al.	2013/0253934	A1	9/2013	Parekh et al.
2009/0193345	A1	7/2009	Wensley et al.	2013/0259254	A1	10/2013	Xiang et al.
2009/0222115	A1	9/2009	Malcolm et al.	2013/0279706	A1	10/2013	Marti et al.
2009/0228919	A1	9/2009	Zott et al.	2013/0287186	A1	10/2013	Quady
2009/0232326	A1	9/2009	Gordon et al.	2013/0290504	A1	10/2013	Quady
2009/0251604	A1	10/2009	Iyer	2013/0293345	A1	11/2013	Lambourne
2010/0004983	A1	1/2010	Dickerson et al.	2014/0006483	A1	1/2014	Garmark et al.
2010/0010651	A1	1/2010	Kirkeby et al.	2014/0016784	A1	1/2014	Sen et al.
2010/0031366	A1	2/2010	Knight et al.	2014/0016786	A1	1/2014	Sen
2010/0049835	A1	2/2010	Ko et al.	2014/0016802	A1	1/2014	Sen
2010/0052843	A1	3/2010	Cannistraro	2014/0023196	A1	1/2014	Xiang et al.
2010/0067716	A1	3/2010	Katayama	2014/0037097	A1	2/2014	Labosco
2010/0087089	A1	4/2010	Struthers et al.	2014/0064501	A1	3/2014	Olsen et al.
2010/0142735	A1	6/2010	Yoon et al.	2014/0075308	A1	3/2014	Sanders et al.
2010/0153097	A1	6/2010	Hotho et al.	2014/0075311	A1	3/2014	Boettcher et al.
2010/0228740	A1	9/2010	Cannistraro et al.	2014/0079242	A1	3/2014	Nguyen et al.
2010/0272270	A1	10/2010	Chaikin et al.	2014/0108929	A1	4/2014	Garmark et al.
2010/0284389	A1	11/2010	Ramsay et al.	2014/0112481	A1	4/2014	Li et al.
2010/0290643	A1	11/2010	Mihelich et al.	2014/0123005	A1	5/2014	Forstall et al.
2010/0299639	A1	11/2010	Ramsay et al.	2014/0140530	A1	5/2014	Gomes-Casseres et al.
2011/0001632	A1	1/2011	Hohorst	2014/0161265	A1	6/2014	Chaikin et al.
2011/0002487	A1	1/2011	Panther et al.	2014/0181569	A1	6/2014	Millington et al.
2011/0044476	A1	2/2011	Burlingame et al.	2014/0219456	A1	8/2014	Morrell et al.
2011/0066943	A1	3/2011	Brillon et al.	2014/0226823	A1	8/2014	Sen et al.
2011/0110533	A1	5/2011	Choi et al.	2014/0242913	A1	8/2014	Pang
2011/0170710	A1	7/2011	Son	2014/0256260	A1	9/2014	Ueda et al.
2011/0228944	A1	9/2011	Croghan et al.	2014/0267148	A1	9/2014	Luna et al.
2011/0299696	A1	12/2011	Holmgren et al.	2014/0270202	A1	9/2014	Ivanov et al.
2011/0316768	A1	12/2011	McRae	2014/0273859	A1	9/2014	Luna et al.
2012/0029671	A1	2/2012	Millington et al.	2014/0279889	A1	9/2014	Luna et al.
2012/0030366	A1	2/2012	Collart et al.	2014/0285313	A1	9/2014	Luna et al.
2012/0047435	A1	2/2012	Holladay et al.	2014/0286496	A1	9/2014	Luna et al.
2012/0051558	A1	3/2012	Kim et al.	2014/0294200	A1	10/2014	Baumgarte et al.
2012/0051567	A1	3/2012	Castor-Perry	2014/0298174	A1	10/2014	Ikonomov
2012/0060046	A1	3/2012	Millington	2014/0323036	A1	10/2014	Daley et al.
2012/0127831	A1	5/2012	Gicklhorn et al.	2014/0344689	A1	11/2014	Scott et al.
2012/0129446	A1	5/2012	Ko et al.	2014/0355768	A1	12/2014	Sen et al.
2012/0148075	A1	6/2012	Goh et al.	2014/0355794	A1	12/2014	Morrell et al.
2012/0185771	A1	7/2012	Rothkopf et al.	2014/0378056	A1	12/2014	Liu et al.
2012/0192071	A1	7/2012	Millington	2015/0019670	A1	1/2015	Redmann
2012/0207290	A1	8/2012	Moyers et al.	2015/0026613	A1	1/2015	Kwon et al.
2012/0237054	A1	9/2012	Eo et al.	2015/0032844	A1	1/2015	Tarr et al.
2012/0263325	A1	10/2012	Freeman et al.	2015/0043736	A1	2/2015	Olsen et al.
2012/0281058	A1	11/2012	Laney et al.	2015/0049248	A1	2/2015	Wang et al.
2012/0290621	A1	11/2012	Heitz, III et al.	2015/0063610	A1	3/2015	Mossner
2013/0010970	A1	1/2013	Hegarty et al.	2015/0074527	A1	3/2015	Sevigny et al.
2013/0018960	A1	1/2013	Knysz et al.	2015/0074528	A1	3/2015	Sakalowsky et al.
2013/0028443	A1	1/2013	Pance et al.	2015/0098576	A1	4/2015	Sundaresan et al.
2013/0031475	A1	1/2013	Maor et al.	2015/0139210	A1	5/2015	Marin et al.
2013/0038726	A1	2/2013	Kim	2015/0146886	A1	5/2015	Baumgarte
				2015/0201274	A1	7/2015	Ellner et al.
				2015/0256954	A1	9/2015	Carlsson et al.
				2015/0281866	A1	10/2015	Williams et al.
				2015/0286360	A1	10/2015	Wachter et al.

US 10,469,966 B2

Page 9

(56) **References Cited**

U.S. PATENT DOCUMENTS

2015/0304288 A1 10/2015 Balasaygun et al.
 2015/0365987 A1 12/2015 Weel
 2017/0188152 A1 6/2017 Watson et al.

WO 2012137190 A1 10/2012
 WO 2013012582 1/2013
 WO 2014004182 1/2014
 WO 2014149533 A2 9/2014
 WO 2015024881 A1 2/2015

OTHER PUBLICATIONS

FOREIGN PATENT DOCUMENTS

CN 101095372 A 12/2007
 CN 101292500 A 10/2008
 CN 101785182 A 7/2010
 EP 0251584 A2 1/1988
 EP 0672985 A1 9/1995
 EP 0772374 A2 5/1997
 EP 1111527 A2 6/2001
 EP 1122931 A2 8/2001
 EP 1133896 B1 8/2002
 EP 1312188 A1 5/2003
 EP 1389853 A1 2/2004
 EP 2713281 4/2004
 EP 1517464 A2 3/2005
 EP 0895427 A3 1/2006
 EP 1416687 B1 8/2006
 EP 1410686 3/2008
 EP 2043381 A2 4/2009
 EP 2161950 A2 3/2010
 EP 1825713 B1 10/2012
 EP 0742674 B1 4/2014
 EP 2591617 B1 6/2014
 EP 2860992 A1 4/2015
 GB 2284327 A 5/1995
 GB 2338374 12/1999
 GB 2379533 A 3/2003
 GB 2486183 6/2012
 JP 63269633 11/1988
 JP 07-210129 8/1995
 JP 2000149391 A 5/2000
 JP 2001034951 2/2001
 JP 2002111817 4/2002
 JP 2002123267 A 4/2002
 JP 2002358241 A 12/2002
 JP 2003037585 2/2003
 JP 2003506765 A 2/2003
 JP 2003101958 4/2003
 JP 2003169089 A 6/2003
 JP 2004193868 A 7/2004
 JP 2005108427 4/2005
 JP 2005136457 5/2005
 JP 2007241652 A 9/2007
 JP 2007288405 A 11/2007
 JP 2009506603 A 2/2009
 JP 2009135750 6/2009
 JP 2009218888 9/2009
 JP 2009535708 10/2009
 JP 2009538006 A 10/2009
 JP 2011010183 A 1/2011
 JP 2011130496 6/2011
 JP 2011176581 9/2011
 TW 439027 6/2001
 WO 199525313 9/1995
 WO 1999023560 5/1999
 WO 199961985 12/1999
 WO 0019693 A1 4/2000
 WO 2000019693 A1 4/2000
 WO 0110125 A1 2/2001
 WO 200153994 7/2001
 WO 02073851 9/2002
 WO 03093950 A2 11/2003
 WO 2003093950 A2 11/2003
 WO 2005013047 A2 2/2005
 WO 2007023120 A1 3/2007
 WO 2007127485 11/2007
 WO 2007131555 11/2007
 WO 2007135581 A2 11/2007
 WO 2008082350 A1 7/2008
 WO 2008114389 A1 9/2008
 WO 2012050927 4/2012

Non-Final Office Action dated Nov. 19, 2014, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 9 pages.

Non-Final Office Action dated Aug. 20, 2009, issued in connection with U.S. Appl. No. 11/906,702, filed Oct. 2, 2007, 27 pages.

Non-Final Office Action dated Oct. 20, 2016, issued in connection with U.S. Appl. No. 14/563,515, filed Dec. 8, 2014, 10 pages.

Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/080,591, filed Mar. 25, 2016, 9 pages.

Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/080,716, filed Mar. 25, 2016, 8 pages.

Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/088,283, filed Apr. 1, 2016, 9 pages.

Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/088,532, filed Apr. 1, 2016, 9 pages.

Non-Final Office Action dated Aug. 22, 2018, issued in connection with U.S. Appl. No. 15/487,686, filed Apr. 14, 2017, 13 pages.

Non-Final Office Action dated Dec. 22, 2014, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 11 pages.

Non-Final Office Action dated Sep. 22, 2016, issued in connection with U.S. Appl. No. 15/088,906, filed Apr. 1, 2016, 9 pages.

Non-Final Office Action dated Sep. 22, 2016, issued in connection with U.S. Appl. No. 15/155,149, filed May 16, 2016, 7 pages.

Non-Final Office Action dated Jun. 23, 2015, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 30 pages.

Non-Final Office Action dated Mar. 23, 2015, issued in connection with U.S. Appl. No. 14/299,847, filed Jun. 9, 2014, 14 pages.

Non-Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 11 pages.

Non-Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 11 pages.

Non-Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 9 pages.

Non-Final Office Action dated Sep. 23, 2014, issued in connection with U.S. Appl. No. 13/630,565, filed Sep. 28, 2012, 7 pages.

Non-Final Office Action dated Feb. 24, 2017, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 9 pages.

Non-Final Office Action dated May 24, 2016, issued in connection with U.S. Appl. No. 15/134,767, filed Apr. 21, 2016, 12 pages.

Non-Final Office Action dated Oct. 24, 2014, issued in connection with U.S. Appl. No. 13/435,776, filed Mar. 30, 2012, 14 pages.

Non-Final Office Action dated Apr. 25, 2018, issued in connection with U.S. Appl. No. 15/130,919, filed Apr. 15, 2016, 13 pages.

Non-Final Office Action dated Feb. 26, 2015, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 25 pages.

Non-Final Office Action dated Mar. 26, 2015, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 18 pages.

Non-Final Office Action dated Jan. 27, 2015, issued in connection with U.S. Appl. No. 14/465,457, filed Aug. 21, 2014, 11 pages.

Non-Final Office Action dated Jun. 27, 2008, issued in connection with U.S. Appl. No. 10/861,653, filed Jun. 5, 2004, 19 pages.

Non-Final Office Action dated Mar. 27, 2015, issued in connection with U.S. Appl. No. 13/705,178, filed Dec. 5, 2012, 14 pages.

Non-Final Office Action dated Sep. 27, 2013, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 12 pages.

Non-Final Office Action dated Sep. 27, 2016, issued in connection with U.S. Appl. No. 15/228,685, filed Aug. 4, 2016, 8 pages.

Non-Final Office Action dated Dec. 28, 2015, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 29 pages.

Non-Final Office Action dated Dec. 28, 2016, issued in connection with U.S. Appl. No. 15/343,000, filed Nov. 3, 2016, 11 pages.

Non-Final Office Action dated Jan. 29, 2016, issued in connection with U.S. Appl. No. 14/937,523, filed Nov. 10, 2015, 10 pages.

Non-Final Office Action dated Jun. 29, 2016, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 12 pages.

US 10,469,966 B2

Page 10

(56)

References Cited

OTHER PUBLICATIONS

Non-Final Office Action dated Apr. 30, 2012, issued in connection with U.S. Appl. No. 13/204,511, filed Aug. 5, 2011, 16 pages.

Non-Final Office Action dated Jan. 30, 2015, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 29 pages.

Non-Final Office Action dated Jan. 30, 2015, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 13 pages.

Non-Final Office Action dated Nov. 30, 2016, issued in connection with U.S. Appl. No. 15/243,186, filed Aug. 22, 2016, 12 pages.

Non-Final Office Action dated Oct. 30, 2018, issued in connection with U.S. Appl. No. 16/128,443, filed Sep. 11, 2018, 21 pages.

Non-Final Office Action dated Sep. 30, 2016, issued in connection with U.S. Appl. No. 13/864,249, filed Apr. 17, 2013, 12 pages.

Non-Final Office Action dated Oct. 31, 2016, issued in connection with U.S. Appl. No. 14/806,070, filed Jul. 22, 2015, 11 pages.

North American MPEG-2 Information, "The MPEG-2 Transport Stream," Retrieved from the Internet: URL: <http://www.coolstf.mpeg/#ts>, 2006, pp. 1-5.

Notice of Allowability dated Apr. 18, 2013, issued in connection with U.S. Appl. No. 11/853,790, filed Sep. 11, 2007, 4 pages.

Notice of Allowance dated Jan. 31, 2013, issued in connection with U.S. Appl. No. 13/298,090, filed Nov. 16, 2011, 19 pages.

Notice of Allowance dated Dec. 1, 2016, issued in connection with U.S. Appl. No. 15/088,283, filed Apr. 1, 2016, 9 pages.

Notice of Allowance dated Jun. 1, 2017, issued in connection with U.S. Appl. No. 14/808,397, filed Jul. 24, 2015, 5 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/088,532, filed Apr. 1, 2016, 9 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/088,678, filed Apr. 1, 2016, 9 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/089,758, filed Apr. 4, 2016, 9 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/155,149, filed May 16, 2016, 9 pages.

Notice of Allowance dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 17 pages.

Notice of Allowance dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 19 pages.

"ZR-8630AV MultiZone Audio/Video Receiver, Installation and Operation Guide," Niles Audio Corporation, 2003, 86 pages.

ZX135: Installation Manual, LA Audio, Apr. 2003, 44 pages.

Sonos, Inc. v. D&M Holdings, Inc., Defendants' Final Invalidation Contentions (Jan. 18, 2017) (106 pages).

Sonos, Inc. v. D&M Holdings, DI 226, Opinion Denying Inequitable Conduct Defenses, Feb. 6, 2017, updated, 5 pages.

Sonos, Inc. v. D&M Holdings, DI 242, US District Judge Andrews 101 Opinion, Mar. 2017, 36 pages.

Sonos, Inc. v. D&M Holdings, Sonos Supp Opening Markman Brief including Exhibits, Mar. 3, 2017, 17 pages.

Sonos, Inc. v. D&M Holdings, Sonos Supp Reply Markman Brief including Exhibits, Mar. 29, 2017, 36 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Declaration of Steven C. Visser, executed Sep. 9, 2016, 40 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 1: Defendants' Invalidation Contentions for U.S. Pat. No. 7,571,014 filed Sep. 16, 2016, 270 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 10: Defendants' Invalidation Contentions for U.S. Pat. No. 9,219,959 filed Sep. 27, 2016, 236 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 11: Defendants' Invalidation Contentions for Design U.S. Pat. No. D. 559,197 filed Sep. 27, 2016, 52 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 2: Defendants' Invalidation Contentions for U.S. Pat. No. 8,588,949 filed Sep. 27, 2016, 224 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 3: Defendants' Invalidation Contentions for U.S. Pat. No. 8,843,224 filed Sep. 27, 2016, 147 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 4: Defendants' Invalidation Contentions for U.S. Pat. No. 8,938,312 filed Sep. 27, 2016, 229 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 5: Defendants' Invalidation Contentions for U.S. Pat. No. 8,938,637 filed Sep. 27, 2016, 213 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 6: Defendants' Invalidation Contentions for U.S. Pat. No. 9,042,556 filed Sep. 27, 2016, 162 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 7: Defendants' Invalidation Contentions for U.S. Pat. No. 9,195,258 filed Sep. 27, 2016, 418 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 8: Defendants' Invalidation Contentions for U.S. Pat. No. 9,202,509 filed Sep. 27, 2016, 331 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 9: Defendants' Invalidation Contentions for U.S. Pat. No. 9,213,357 filed Sep. 27, 2016, 251 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 1: Defendants' Invalidation Contentions for U.S. Pat. No. 7,571,014 filed Apr. 15, 2016, 161 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 10: Defendants' Invalidation Contentions for U.S. Pat. No. 9,213,357 filed Apr. 15, 2016, 244 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 11: Defendants' Invalidation Contentions for U.S. Pat. No. 9,219,959 filed Apr. 15, 2016, 172 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 12: Defendants' Invalidation Contentions for Design U.S. Pat. No. D. 559,197 filed Apr. 15, 2016, 36 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 2: Defendants' Invalidation Contentions for U.S. Pat. No. 8,588,949 filed Apr. 15, 2016, 112 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 3: Defendants' Invalidation Contentions for U.S. Pat. No. 8,843,224 filed Apr. 15, 2016, 118 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 4: Defendants' Invalidation Contentions for U.S. Pat. No. 8,938,312 filed Apr. 15, 2016, 217 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 5: Defendants' Invalidation Contentions for U.S. Pat. No. 8,938,637 filed Apr. 15, 2016, 177 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 6: Defendants' Invalidation Contentions for U.S. Pat. No. 9,042,556 filed Apr. 15, 2016, 86 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 7: Defendants' Invalidation Contentions for U.S. Pat. No. 9,130,771 filed Apr. 15, 2016, 203 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 8: Defendants' Invalidation Contentions for U.S. Pat. No. 9,195,258 filed Apr. 15, 2016, 400 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 9: Defendants' Invalidation Contentions for U.S. Pat. No. 9,202,509 filed Apr. 15, 2016, 163 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Preliminary Identification of Prior Art References, provided Jul. 29, 2016, 5 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' Brief in Support of their Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Oct. 12, 2016, 24 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' Opposition to Sonos's Motion to Strike Defendants' New Amended Answer Submitted with their Reply, provided Oct. 3, 2016, 15 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' Second Amended Answer to Plaintiffs' Third Amended complaint, provided Oct. 12, 2016, 43 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit B: Defendants' Second Amended Answer to Plaintiffs' Third Amended Complaint, provided Oct. 12, 2016, 43 pages.

US 10,469,966 B2

Page 11

(56)

References Cited

OTHER PUBLICATIONS

Sonos, Inc. v. D&M Holdings Inc. et al., Opening Brief in Support of Defendants' Motion for Leave to Amend Their Answer to Add the Defense of Inequitable Conduct, provided Aug. 1, 2016, 11 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Order, provided Oct. 7, 2016, 2 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Plaintiff's Opposition to Defendants' Motion for Leave to Amend Their Answer to Add the Defense of Inequitable Conduct, provided Aug. 26, 2016, 25 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Redlined Exhibit B: Defendants' First Amended Answer to Plaintiffs' Third Amended Complaint, provided Aug. 1, 2016, 27 pages.

Sonos, Inc. v. D&M Holdings, DI 206-1, Transcript of 101 Hearing (Nov. 28, 2016) (28 pages).

Sonos, Inc. v. D&M Holdings, DI 207, Public Joint Claim Construction Brief (Nov. 30, 2016) (88 pages).

Sonos, Inc. v. D&M Holdings, DI 214, D&M Post-Markman Letter (Dec. 22, 2016) (13 pages).

Sonos, Inc. v. D&M Holdings, DI 215, Sonos Post-Markman Letter (Dec. 22, 2016) (15 pages).

Sonos, Inc. v. D&M Holdings, DI 219, Claim Construction Opinion (Jan. 12, 2017) (24 pages).

Sonos, Inc. v. D&M Holdings, DI 221, Claim Construction Order (Jan. 18, 2017) (2 pages).

Sonos, Inc. v. D&M Holdings, Markman Hearing Transcript (Dec. 14, 2016) (69 pages).

Sonos Multi-Room Music System User Guide, Version: 091001, 2009, 299 pages.

Sonos Play:3 Product Guide; copyright 2004-2011; 2 pages.

Sonos Play:3 Product Guide; copyright 2004-2012; 14 pages.

Sonos Play:3 Product Guide; copyright 2004-2013; 15 pages.

Sonos Play:3 Teardown; <https://www.ifixit.com/Teardown/Sonos+Play%3A3+Teardown/12475>; 11 pages.

Non-Final Office Action dated May 27, 2014, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 13 pages.

Non-Final Office Action dated Feb. 29, 2012, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 10 pages.

Non-Final Office Action dated Nov. 29, 2010, issued in connection with U.S. Appl. No. 11/801,468, filed May 9, 2007, 17 pages.

Non-Final Office Action dated Jul. 30, 2013 issued in connection with U.S. Appl. No. 13/724,048, filed Dec. 21, 2012, 7 pages.

Non-Final Office Action dated Jul. 31, 2014, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 31 pages.

Non-Final Office Action dated Dec. 1, 2014, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 11 pages.

Non-Final Office Action dated Jun. 1, 2016, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 21 pages.

Non-Final Office Action dated Jan. 3, 2017, issued in connection with U.S. Appl. No. 14/808,397, filed Jul. 24, 2015, 11 pages.

Non-Final Office Action dated Jun. 3, 2015, issued in connection with U.S. Appl. No. 14/564,544, filed Dec. 9, 2014, 7 pages.

Non-Final Office Action dated Nov. 3, 2016, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 17 pages.

Non-Final Office Action dated Jan. 4, 2017, issued in connection with U.S. Appl. No. 14/825,961, filed Aug. 13, 2015, 11 pages.

Non-Final Office Action dated Jun. 4, 2015, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 16 pages.

Non-Final Office Action dated Mar. 4, 2015, issued in connection with U.S. Appl. No. 13/435,776, filed Mar. 30, 2012, 16 pages.

Non-Final Office Action dated Oct. 4, 2016, issued in connection with U.S. Appl. No. 15/089,758, filed Apr. 4, 2016, 9 pages.

Non-Final Office Action dated Oct. 5, 2016, issued in connection with U.S. Appl. No. 13/864,250, filed Apr. 17, 2013, 10 pages.

Non-Final Office Action dated Oct. 5, 2016, issued in connection with U.S. Appl. No. 13/864,252, filed Apr. 17, 2013, 11 pages.

Non-Final Office Action dated Oct. 6, 2016, issued in connection with U.S. Appl. No. 15/088,678, filed Apr. 1, 2016, 9 pages.

Non-Final Office Action dated Jul. 7, 2015, issued in connection with U.S. Appl. No. 14/174,244, filed Feb. 6, 2014, 9 pages.

Non-Final Office Action dated Oct. 7, 2016, issued in connection with U.S. Appl. No. 15/156,392, filed May 17, 2016, 8 pages.

Non-Final Office Action issued Mar. 8, 2011, issued in connection with U.S. Appl. No. 11/853,790, filed Sep. 11, 2007, 10 pages.

Non-Final Office Action dated Mar. 8, 2016, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 13 pages.

Non-Final Office Action dated Aug. 9, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 31 pages.

Non-Final Office Action dated May 9, 2014, issued in connection with U.S. Appl. No. 13/892,230, filed May 10, 2013, 10 pages.

Non-Final Office Action dated Nov. 1, 2018, issued in connection with U.S. Appl. No. 16/129,758, filed Sep. 12, 2018, 23 pages.

Non-Final Office Action dated Feb. 10, 2016, issued in connection with U.S. Appl. No. 14/937,571, filed Nov. 10, 2015, 9 pages.

Non-Final Office Action dated Mar. 10, 2011, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 12 pages.

Non-Final Office Action dated May 10, 2016, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 22 pages.

Non-Final Office Action dated Nov. 10, 2016, issued in connection with U.S. Appl. No. 15/243,355, filed Aug. 22, 2016, 11 pages.

Non-Final Office Action dated Jun. 11, 2018, issued in connection with U.S. Appl. No. 15/405,931, filed Jan. 13, 2017, 14 pages.

Non-Final Office Action dated Dec. 12, 2016, issued in connection with U.S. Appl. No. 15/343,019, filed Nov. 3, 2016, 8 pages.

Non-Final Office Action dated Jun. 12, 2015, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 16 pages.

Non-Final Office Action dated Mar. 12, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 13 pages.

Non-Final Office Action dated Oct. 12, 2016, issued in connection with U.S. Appl. No. 14/505,966, filed Oct. 3, 2014, 10 pages.

Non-Final Office Action dated Feb. 13, 2014, issued in connection with U.S. Appl. No. 13/896,037, filed May 16, 2013, 10 pages.

Non-Final Office Action dated Feb. 13, 2015, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 14 pages.

Non-Final Office Action dated Jan. 13, 2016, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 14 pages.

Non-Final Office Action dated Jun. 13, 2016, issued in connection with U.S. Appl. No. 14/620,937, filed Feb. 12, 2015, 12 pages.

Non-Final Office Action dated Jun. 13, 2016, issued in connection with U.S. Appl. No. 15/134,761, filed Apr. 21, 2016, 10 pages.

Non-Final Office Action dated Mar. 13, 2015, issued in connection with U.S. Appl. No. 13/705,177, filed Dec. 5, 2012, 15 pages.

Non-Final Office Action dated May 14, 2018, issued in connection with U.S. Appl. No. 15/228,812, filed Aug. 4, 2016, 15 pages.

Non-Final Office Action dated Dec. 15, 2016, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 12 pages.

Non-Final Office Action dated Jul. 15, 2015, issued in connection with U.S. Appl. No. 14/174,253, filed Feb. 6, 2014, 9 pages.

Non-Final Office Action dated Nov. 16, 2016, issued in connection with U.S. Appl. No. 15/228,639, filed Aug. 4, 2016, 15 pages.

Non-Final Office Action dated Dec. 17, 2015, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 10 pages.

Non-Final Office Action dated Nov. 17, 2014, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 11 pages.

Non-Final Office Action dated Nov. 17, 2016, issued in connection with U.S. Appl. No. 14/620,937, filed Feb. 12, 2015, 14 pages.

Non-Final Office Action dated Feb. 18, 2009, issued in connection with U.S. Appl. No. 10/861,653, filed Jun. 5, 2004, 18 pages.

Non-Final Office Action dated Nov. 18, 2014, issued in connection with U.S. Appl. No. 13/435,739, filed Mar. 30, 2012, 10 pages.

Non-Final Office Action dated Jan. 19, 2018, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 14 pages.

Non-Final Office Action dated Jun. 19, 2015, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 38 pages.

Notice of Allowance dated Oct. 24, 2016, issued in connection with U.S. Appl. No. 15/134,767, filed Apr. 21, 2016, 7 pages.

Notice of Allowance dated Sep. 24, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 7 pages.

Notice of Allowance dated Sep. 24, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 7 pages.

Notice of Allowance dated Aug. 25, 2017, issued in connection with U.S. Appl. No. 14/505,966, filed Oct. 3, 2014, 5 pages.

US 10,469,966 B2

Page 12

(56) **References Cited**

OTHER PUBLICATIONS

Notice of Allowance dated Sep. 25, 2014, issued in connection with U.S. Appl. No. 14/176,808, filed Feb. 10, 2014, 5 pages.

Notice of Allowance dated Aug. 27, 2015, issued in connection with U.S. Appl. No. 13/705,177, filed Dec. 5, 2012, 34 pages.

Notice of Allowance dated Aug. 27, 2015, issued in connection with U.S. Appl. No. 14/505,027, filed Oct. 2, 2014, 18 pages.

Notice of Allowance dated Dec. 27, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 15 pages.

Notice of Allowance dated Oct. 27, 2015, issued in connection with U.S. Appl. No. 14/299,847, filed Jun. 9, 2014, 5 pages.

Notice of Allowance dated Dec. 28, 2014, issued in connection with U.S. Appl. No. 13/896,037, filed May 16, 2013, 7 pages.

Notice of Allowance dated Jul. 29, 2015, issued in connection with U.S. Appl. No. 13/359,976, filed Jan. 27, 2012, 28 pages.

Notice of Allowance dated Jul. 29, 2015, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 9 pages.

Notice of Allowance dated Aug. 30, 2016, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 7 pages.

Notice of Allowance dated Jul. 30, 2015, issued in connection with U.S. Appl. No. 13/705,178, filed Dec. 5, 2012, 18 pages.

Notice of Allowance dated May 30, 2019, issued in connection with U.S. Appl. No. 16/129,758, filed Sep. 12, 2018, 7 pages.

Notice of Allowance dated Aug. 5, 2015, issued in connection with U.S. Appl. No. 13/435,776, filed Mar. 30, 2012, 26 pages.

Notice of Allowance dated Jul. 6, 2015, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 24 pages.

Notice of Allowance dated Apr. 7, 2017, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 8 pages.

Notice of Allowance dated Dec. 7, 2018, issued in connection with U.S. Appl. No. 15/228,812, filed Aug. 4, 2016, 7 pages.

Notice of Incomplete Re-Exam Request dated May 25, 2017, issued in connection with U.S. Appl. No. 90/013,959, filed Apr. 1, 2016, 10 pages.

Notice of Intent to Issue Re-Examination Certificate dated Mar. 24, 2017, issued in connection with U.S. Appl. No. 90/013,859, filed Nov. 4, 2016, 10 pages.

Nutzel et al., "Sharing Systems for Future HiFi Systems," IEEE, 2004, 9 pages.

Office Action in Ex Parte Reexamination dated Oct. 20, 2017, issued in connection with Reexamination U.S. Appl. No. 90/013,959, filed Jun. 16, 2017, 50 pages.

Palm, Inc., "Handbook for the Palm VII Handheld," May 2000, 311 pages.

Parasound Zpre2 Zone Preamplifier with PTZI Remote Control, 2005, 16 pages.

Park et al., "Group Synchronization in MultiCast Media Communications," Proceedings of the 5th Research on Multicast Technology Workshop, 2003, 5 pages.

Pillai et al., "A Method to Improve the Robustness of MPEG Video Applications over Wireless Networks," Kent Ridge Digital Labs, 2000, 15 pages.

Polycom Conference Composer User Guide, copyright 2001, 29 pages.

Postel, J., "User Datagram Protocol," RFC: 768, USC/Information Sciences Institute, Aug. 1980, 3 pages.

Preinterview First Office Action dated Jun. 8, 2016, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 4 pages.

Pre-Interview First Office Action dated Mar. 10, 2015, issued in connection with U.S. Appl. No. 14/505,027, filed Oct. 2, 2014, 4 pages.

Presentations at WinHEC 2000, May 2000, 138 pages.

PRISMIQ, Inc., "PRISMIQ Media Player User Guide," 2003, 44 pages.

Proficient Audio Systems M6 Quick Start Guide, 2011, 5 pages.

Proficient Audio Systems: Proficient Editor Advanced Programming Guide, 2007, 40 pages.

Programming Interface for WL54040 Dual-Band Wireless Transceiver, AVAGO0066, Agere Systems, May 2004, 16 pages.

Radio Shack, "Auto-Sensing 4-Way Audio/Video Selector Switch," 2004, 1 page.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 1, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 2, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 3, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 4, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 5, 46 pages.

Rane: DragNet software; available for sale at least 2006.

Rangan et al., "Feedback Techniques for Continuity and Synchronization in Multimedia Information Retrieval," ACM Transactions on Information Systems, 1995, pp. 145-176, vol. 13, No. 2.

Real Time Control Protocol (RTCP) and Realtime Transfer Protocol (RTP), RFC 1889 (Jan. 1996) (D+M_0397810-84) (75 pages).

Realtime Streaming Protocol (RTSP), RFC 2326 (Apr. 1998) (D+M_0397945-8036) (92 pages).

Realtime Transport Protocol (RTP), RFC 3550 (Jul. 2003) (D+M_0398235-323) (89 pages).

Re-Exam Final Office Action dated Aug. 5, 2015, issued in connection with U.S. Appl. No. 90/013,423, filed Jan. 5, 2015, 25 pages.

Reexam Non-Final Office Action dated Oct. 17, 2016, issued in connection with U.S. Appl. No. 90/013,756, filed May 25, 2016, 31 pages.

Re-Exam Non-Final Office Action dated Apr. 22, 2015, issued in connection with U.S. Appl. No. 90/013,423, filed Jan. 5, 2015, 16 pages.

Levergood et al., "AudioFile: A Network-Transparent System for Distributed Audio Applications," Digital Equipment Corporation, 1993, 109 pages.

LG: RJP-201M Remote Jack Pack Installation and Setup Guide, 2010, 24 pages.

Lienhart et al., "On the Importance of Exact Synchronization for Distributed Audio Signal Processing," Session L: Poster Session II—ICASSP'03 Papers, 2002, 1 page.

LinkSys by Cisco, Wireless Home Audio Controller, Wireless-N Touchscreen Remote DMRW1000 Datasheet, Copyright 2008, 2 pages.

LinkSys by Cisco, Wireless Home Audio Controller, Wireless-N Touchscreen Remote DMRW1000 User Guide, Copyright 2008, 64 pages.

LinkSys by Cisco, Wireless Home Audio Player, Wireless-N Music Extender DMP100 Quick Installation Guide, Copyright 2009, 32 pages.

LinkSys by Cisco, Wireless Home Audio Player, Wireless-N Music Extender DMP100 User Guide, Copyright 2008, 65 pages.

Linux SDK for UPnP Devices v. 1.2 (Sep. 6, 2002) (101 pages).

Liu et al., "A synchronization control scheme for real-time streaming multimedia applications," Packet Video, 2003, 10 pages, vol. 2003.

Liu et al., "Adaptive Delay Concealment for Internet Voice Applications with Packet-Based Time-Scale Modification," Information Technologies 2000, pp. 91-102.

Louderback, Jim, "Affordable Audio Receiver Furnishes Homes With MP3," TechTV Vault. Jun. 28, 2000 retrieved Jul. 10, 2014, 2 pages.

Machine Translation of JP2004-193868A Wireless Transmission and Reception System and Wireless Transmission and Reception Method, 2 pages.

Machine Translation of JP2007-2888405A Video Sound Output System, Video Sound Processing Method, and Program, 64 pages.

Maniactools, "Identify Duplicate Files by Sound," Sep. 28, 2010, <http://www.maniactools.com/soft/music-duplicate-remover/identify-duplicate-files-by-sound.shtml>.

MediaRenderer:1 Device Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (12 pages).

MediaServer:1 Device Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (12 pages).

Microsoft, Universal Plug and Play (UPnP) Client Support ("Microsoft UPnP") (Aug. 2001) (D+M_0402007-24) (18 pages).

Microsoft Window's XP Reviewer's Guide (Aug. 2001) (D+M_0402225-85) (61 pages).

US 10,469,966 B2

Page 13

(56) **References Cited**

OTHER PUBLICATIONS

"Microsoft Windows XP File and Printer Share with Microsoft Windows" Microsoft Windows XP Technical Article, 2003, 65 pages.

Mills David L., "Network Time Protocol (Version 3) Specification, Implementation and Analysis," Network Working Group, Mar. 1992, 7 pages.

Mills, David L., "Precision Synchronization of Computer Network Clocks," ACM SIGCOMM Computer Communication Review, 1994, pp. 28-43, vol. 24, No. 2.

"Model MRC44 Four Zone—Four Source Audio/Video Controller/Amplifier System," Xantech Corporation, 2002, 52 pages.

Motorola, "Simplefi, Wireless Digital Audio Receiver, Installation and User Guide," Dec. 31, 2001, 111 pages.

"SMPTE Made Simple: A Time Code Tutor by Timeline," 1996, 46 pages.

Network Time Protocol (NTP), RFC 1305 (Mar. 1992) (D+M_0397417-536) (120 pages).

"NexSys Software v.3 Manual," Crest Audio, Inc., 1997, 76 pages.

Niederst, Jennifer "O'Reilly Web Design in a Nutshell," Second Edition, Sep. 2001, 678 pages.

Nilsson, M., "ID3 Tag Version 2," Mar. 26, 1998, 28 pages.

Non-Final Office Action dated May 1, 2014, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 31 pages.

Non-Final Office Action dated Dec. 5, 2013, issued in connection with U.S. Appl. No. 13/827,653, filed Mar. 14, 2013, 28 pages.

Non-Final Office Action dated Jan. 5, 2012, issued in connection with U.S. Appl. No. 13/298,090, filed Nov. 16, 2011, 40 pages.

Non-Final Office Action dated May 6, 2014, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 23 pages.

Non-Final Office Action dated Jan. 7, 2014, issued in connection with U.S. Appl. No. 13/896,829, filed May 17, 2013, 11 pages.

Non-Final Office Action dated Sep. 7, 2016, issued in connection with U.S. Appl. No. 13/864,248, filed Apr. 17, 2013, 12 pages.

Non-final Office Action dated Apr. 10, 2013, issued in connection with U.S. Appl. No. 13/619,237, filed Sep. 14, 2012, 10 pages.

Non-Final Office Action dated Feb. 10, 2014, issued in connection with U.S. Appl. No. 13/083,499, filed Apr. 8, 2011, 12 pages.

Non-Final Office Action dated May 12, 2014, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 23 pages.

Non-Final Office Action dated May 14, 2014, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 14 pages.

Non-Final Office Action dated Jun. 17, 2014, issued in connection with U.S. Appl. No. 14/176,808, filed Feb. 10, 2014, 6 pages.

Non-Final Office Action dated Dec. 18, 2013, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 12 pages.

Non-Final Office Action dated Jan. 18, 2008, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 38 pages.

Non-Final Office Action dated Apr. 19, 2010, issued in connection with U.S. Appl. No. 11/801,468, filed May 9, 2007, 16 pages.

Non-Final Office Action dated Mar. 19, 2013, issued in connection with U.S. Appl. No. 13/724,048, filed Dec. 21, 2012, 9 pages.

Non-Final Office Action dated Jun. 21, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 13 pages.

Non-Final Office Action dated Jan. 22, 2009, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 18 pages.

Non-Final Office Action dated Jul. 23, 2014, issued in connection with U.S. Appl. No. 14/256,434, filed Apr. 18, 2014, 12 pages.

Non-Final Office Action dated Jul. 25, 2014, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 9 pages.

Non-Final Office Action dated Jul. 25, 2014, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 11 pages.

Non-Final Office Action dated Jun. 25, 2010, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 17 pages.

Non-Final Office Action dated Nov. 25, 2013, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 19 pages.

Notice of Allowance dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 23 pages.

Notice of Allowance dated Jun. 2, 2014, issued in connection with U.S. Appl. No. 13/083,499, filed Apr. 8, 2011, 5 pages.

Notice of Allowance dated Sep. 3, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 4 pages.

Notice of Allowance dated Aug. 4, 2015, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 13 pages.

Notice of Allowance dated Dec. 5, 2014, issued in connection with U.S. Appl. No. 14/256,434, filed Apr. 18, 2014, 7 pages.

Notice of Allowance dated Oct. 5, 2012, issued in connection with U.S. Appl. No. 13/204,511, filed Aug. 5, 2011, 11 pages.

Notice of Allowance dated Mar. 6, 2014, issued in connection with U.S. Appl. No. 13/827,653, filed Mar. 14, 2013, 17 pages.

Notice of Allowance dated May 6, 2011, issued in connection with U.S. Appl. No. 11/801,468, filed May 9, 2007, 10 pages.

Notice of Allowance dated Sep. 6, 2013, issued in connection with U.S. Appl. No. 13/619,237, filed Sep. 14, 2012, 10 pages.

Notice of Allowance dated Sep. 6, 2016, issued in connection with U.S. Appl. No. 15/134,767, filed Apr. 21, 2016, 7 pages.

Notice of Allowance dated Apr. 7, 2016, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 40 pages.

Notice of Allowance dated Oct. 7, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 7 pages.

Notice of Allowance dated Oct. 9, 2015, issued in connection with U.S. Appl. No. 13/435,739, filed Mar. 30, 2012, 4 pages.

Notice of Allowance dated Sep. 9, 2016, issued in connection with U.S. Appl. No. 15/134,761, filed Apr. 21, 2016, 7 pages.

Notice of Allowance dated Mar. 1, 2018, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 7 pages.

Notice of Allowance dated Aug. 10, 2015, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 9 pages.

Notice of Allowance dated Jul. 10, 2015, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 7 pages.

Notice of Allowance dated Jun. 10, 2019, issued in connection with U.S. Appl. No. 16/128,443, filed Sep. 11, 2018, 10 pages.

Notice of Allowance dated Mar. 10, 2016, issued in connection with U.S. Appl. No. 14/937,523, filed Nov. 10, 2015, 5 pages.

Notice of Allowance dated Nov. 10, 2011, issued in connection with U.S. Appl. No. 11/906,702, filed Oct. 2, 2007, 17 pages.

Notice of Allowance dated Sep. 10, 2014, issued in connection with U.S. Appl. No. 13/892,230, filed May 10, 2013, 5 pages.

Notice of Allowance dated Sep. 10, 2018, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 7 pages.

Notice of Allowance dated Apr. 11, 2016, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 21 pages.

Notice of Allowance dated Jan. 11, 2016, issued in connection with U.S. Appl. No. 14/564,544, filed Dec. 9, 2014, 5 pages.

Notice of Allowance dated Jul. 11, 2017, issued in connection with U.S. Appl. No. 14/825,961, filed Aug. 13, 2015, 5 pages.

Notice of Allowance dated Aug. 12, 2015, issued in connection with U.S. Appl. No. 13/435,739, filed Mar. 30, 2012, 27 pages.

Notice of Allowance dated Jun. 12, 2014, issued in connection with U.S. Appl. No. 13/896,829, filed May 17, 2013, 5 pages.

Notice of Allowance dated Jul. 13, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 22 pages.

Notice of Allowance dated May 13, 2015, issued in connection with U.S. Appl. No. 14/299,847, filed Jun. 9, 2014, 10 pages.

Notice of Allowance dated Nov. 13, 2013, issued in connection with U.S. Appl. No. 13/724,048, filed Dec. 21, 2012, 7 pages.

Notice of Allowance dated Nov. 13, 2017, issued in connection with U.S. Appl. No. 14/563,515, filed Dec. 8, 2014, 11 pages.

Notice of Allowance dated Oct. 13, 2015, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 7 pages.

Notice of Allowance dated Jun. 14, 2012, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 9 pages.

Notice of Allowance dated Jan. 15, 2019, issued in connection with U.S. Appl. No. 15/487,686, filed Apr. 14, 2017, 8 pages.

Notice of Allowance dated Jul. 15, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 18 pages.

Notice of Allowance dated Mar. 15, 2016, issued in connection with U.S. Appl. No. 14/937,571, filed Nov. 10, 2015, 5 pages.

Notice of Allowance dated Jun. 16, 2009, issued in connection with U.S. Appl. No. 10/861,653, filed Jun. 5, 2004, 11 pages.

Notice of Allowance dated May 16, 2017, issued in connection with U.S. Appl. No. 15/228,685, filed Aug. 4, 2016, 10 pages.

US 10,469,966 B2

Page 14

(56)

References Cited

OTHER PUBLICATIONS

Notice of Allowance dated Jul. 17, 2015, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 20 pages.

Notice of Allowance dated Aug. 19, 2016, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 9 pages.

Notice of Allowance dated May 19, 2015, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 7 pages.

Notice of Allowance dated Oct. 19, 2016, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 14 pages.

Notice of Allowance dated Jan. 20, 2016, issued in connection with U.S. Appl. No. 14/465,457, filed Aug. 21, 2014, 10 pages.

Notice of Allowance dated Oct. 21, 2015, issued in connection with U.S. Appl. No. 14/174,244, filed Feb. 6, 2014, 5 pages.

Notice of Allowance dated Oct. 21, 2015, issued in connection with U.S. Appl. No. 14/174,253, filed Feb. 6, 2014, 6 pages.

Notice of Allowance dated Sep. 21, 2015, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 11 pages.

Notice of Allowance dated Jan. 22, 2015, issued in connection with U.S. Appl. No. 13/630,565, filed Sep. 28, 2012, 7 pages.

Notice of Allowance dated Sep. 22, 2015, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 7 pages.

Notice of Allowance dated May 24, 2017, issued in connection with U.S. Appl. No. 14/806,070, filed Jul. 22, 2015, 5 pages.

Notice of Allowance dated Oct. 24, 2016, issued in connection with U.S. Appl. No. 15/134,761, filed Apr. 21, 2016, 7 pages.

Hans et al., "Interacting with Audio Streams for Entertainment and Communication," Proceedings of the Eleventh ACM International Conference on Multimedia, ACM, 2003, 7 pages.

Herre et al., "The Reference Model Architecture for MPEG Spatial Audio Coding," Audio Engineering Society Convention Paper (Presented at the 118th Convention), May 28-31, 2005, 13 pages.

Home Networking with Universal Plug and Play, IEEE Communications Magazine, vol. 39 No. 12 (Dec. 2001) (D+M_0402025-40) (16 pages).

"Home Theater Control Systems," Cinema Source, 2002, 19 pages.

Horwitz, Jeremy, "Logic3 i-Station25," retrieved from the internet: <http://www.ilounge.com/index.php/reviews/entry/logic3-i-station25/>, last visited Dec. 17, 2013, 5 pages.

Huang C.M., et al., "A Synchronization Infrastructure for Multicast Multimedia at the Presentation Layer," IEEE Transactions on Consumer Electronics, 1997, pp. 370-380, vol. 43, No. 3.

IBM Home Director Installation and Service Manual, Copyright 1998, 124 pages.

IBM Home Director Owner's Manual, Copyright 1999, 67 pages.

ID3 tag version 2.4.0—Native Frames, Draft Specification, copyright 2000, 41 pages.

Implicit, LLC v. Sonos, Inc., Defendant's Original Complaint (Mar. 3, 2017) (15 pages).

Integra Audio Network Receiver NAC 2.3 Instruction Manual, 68 pages.

Integra Audio Network Server NAS 2.3 Instruction Manual, pp. 1-32.

Integra Service Manual, Audio Network Receiver Model NAC-2.3, Dec. 2002, 44 pages.

Intel Designing a UPnP AV Media Renderer, v. 1.0 ("Intel AV Media Renderer") (May 20, 2003) (SONDM000115117-62) (46 pages).

Intel Media Renderer Device Interface ("Intel Media Renderer") (Sep. 6, 2002) (62 pages).

Intel SDK for UPnP Devices Programming Guide, Version 1.2.1, (Nov. 2002) (30 pages).

International Bureau, International Preliminary Report on Patentability dated Jan. 8, 2015, issued in connection with International Application No. PCT/US2013/046372, filed on Jun. 18, 2013, 6 pages.

International Bureau, International Preliminary Report on Patentability, dated Jan. 8, 2015, issued in connection with International Application No. PCT/US2013/046386, filed on Jun. 18, 2013, 8 pages.

International Bureau, International Preliminary Report on Patentability, dated Oct. 17, 2013, issued in connection with International Application No. PCT/IB2012/052071, filed on Apr. 26, 2012, 7 pages.

International Bureau, International Preliminary Report on Patentability dated Jan. 30, 2014, issued in connection with International Application No. PCT/US2012/045894, filed on Jul. 9, 2012, 6 pages.

International Searching Authority, International Search Report dated Aug. 1, 2008, in connection with International Application No. PCT/US2004/023102, 5 pages.

International Searching Authority, International Search Report dated Aug. 23, 2012, issued in connection with International Application No. PCT/IB2012/052071, filed on Apr. 26, 2012, 3 pages.

International Searching Authority, International Search Report dated Aug. 26, 2013, issued in connection with International Application No. PCT/US2013/046372, filed on Jun. 18, 2013, 3 pages.

International Searching Authority, International Search Report dated Dec. 26, 2012, issued in connection with International Application No. PCT/US2012/045894, filed on Jul. 9, 2012, 3 pages.

International Searching Authority, International Search Report dated Sep. 30, 2013, issued in connection with International Application No. PCT/US2013/046386, filed on Jun. 18, 2013, 3 pages.

International Searching Authority, Written Opinion dated Aug. 23, 2012, issued in connection with International Application No. PCT/IB2012/052071, filed on Apr. 26, 2012, 6 pages.

International Searching Authority, Written Opinion dated Aug. 26, 2013, issued in connection with International Application No. PCT/US2013/046372, filed on Jun. 18, 2013, 4 pages.

International Searching Authority, Written Opinion dated Dec. 26, 2012, issued in connection with International Application No. PCT/US2012/045894, filed on Jul. 9, 2012, 4 pages.

International Searching Authority, Written Opinion dated Sep. 30, 2013, issued in connection with International Application No. PCT/US2013/046386, filed on Jun. 18, 2013, 6 pages.

Ishibashi et al., "A Comparison of Media Synchronization Quality Among Reactive Control Schemes," IEEE Infocom, 2001, pp. 77-84.

Ishibashi et al., "A Group Synchronization Mechanism for Live Media in Multicast Communications," IEEE Global Telecommunications Conference, 1997, pp. 746-752, vol. 2.

Ishibashi et al., "A Group Synchronization Mechanism for Stored Media in Multicast Communications," IEEE Information Revolution and Communications, 1997, pp. 692-700, vol. 2.

Issues with Mixed IEEE 802.b/802.11g Networks, AVAGO0058, Agere Systems, Feb. 2004, 5 pages.

Japanese Patent Office, Decision of Rejection dated Jul. 8, 2014, issued in connection with Japanese Patent Application No. 2012-178711, 3 pages.

Japanese Patent Office, Final Office Action dated Jun. 4, 2019, issued in connection with Japanese Patent Application No. 2017-211958, 8 pages.

Japanese Patent Office, Notice of Rejection, dated Feb. 3, 2015, issued in connection with Japanese Patent Application No. 2014-521648, 7 pages.

Japanese Patent Office, Notice of Rejection dated Sep. 15, 2015, issued in connection with Japanese Patent Application No. 2014-220704, 7 pages.

Japanese Patent Office, Office Action dated Nov. 1, 2016, issued in connection with Japanese Application No. 2015-238682, 7 pages.

Japanese Patent Office, Office Action dated Jan. 6, 2015, issued in connection with Japanese Patent Application No. 2014-503273, 5 pages.

Japanese Patent Office, Office Action Dec. 18, 2018, issued in connection with Japanese Application No. 2017-211958, 8 pages.

Japanese Patent Office, Office Action dated May 24, 2016, issued in connection with Japanese Patent Application No. 2014-220704, 7 pages.

Japanese Patent Office, Office Action dated Mar. 29, 2016, issued in connection with Japanese Patent Application No. JP2015-520288, 12 pages.

US 10,469,966 B2

Page 15

(56)

References Cited

OTHER PUBLICATIONS

Japanese Patent Office, Office Action Summary dated Feb. 2, 2016, issued in connection with Japanese Patent Application No. 2015-520286, 6 pages.

Japanese Patent Office, Office Action Summary dated Sep. 8, 2015, issued in connection with Japanese Patent Application No. 2014-503273, 4 pages.

Japanese Patent Office, Office Action Summary dated Nov. 2013, issued in connection with Japanese Patent Application No. 2012-178711, 5 pages.

Japanese Patent Office, Translation of Office Action dated Dec. 18, 2018, issued in connection with Japanese Application No. 2017-211958, 6 pages.

Jo et al., "Synchronized One-to-many Media Streaming with Adaptive Playout Control," Proceedings of SPIE, 2002, pp. 71-82, vol. 4861.

Jones, Stephen, "Dell Digital Audio Receiver: Digital upgrade for your analog stereo," Analog Stereo, Jun. 24, 2000 retrieved Jun. 18, 2014, 2 pages.

Kou et al., "RenderingControl:1 Service Template Verion 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 63 pages.

Lake Processors: Lake® LM Series Digital Audio Processors Operation Manual, 2011, 71 pages.

Reid, Mark, "Multimedia conferencing over ISDN and IP networks using ITU-T H-series recommendations: architecture, control and coordination," Computer Networks, 1999, pp. 225-235, vol. 31.

RenderingControl:1 Service Template Version 1.01 for UPnP, Version 1.0, (Jun. 25, 2002) (SONDM000115187-249) (63 pages).

Renewed Request for Ex Parte Re-Examination, U.S. Appl. No. 90/013,959 filed Jun. 16, 2017, 126 pages.

Renkus Heinz Manual; available for sale at least 2004, 6 pages.

Request for Ex Parte Reexamination submitted in U.S. Pat. No. 9,213,357 on May 22, 2017, 85 pages.

"Residential Distributed Audio Wiring Practices," Leviton Network Solutions, 2001, 13 pages.

Ritchie et al., "MediaServer:1 Device Template Version 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 12 pages.

Ritchie et al., "UPnP AV Architecture:1, Version 1.0," Contributing Members of the UPnP Forum, Jun. 25, 2002, 22 pages.

Ritchie, John, "MediaRenderer:1 Device Template Version 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 12 pages.

Roland Corporation, "Roland announces BA-55 Portable PA System," press release, Apr. 6, 2011, 2 pages.

Rothermel et al., "An Adaptive Protocol for Synchronizing Media Streams," Institute of Parallel and Distributed High-Performance Systems (IPVR), 1997, 26 pages.

Rothermel et al., "An Adaptive Stream Synchronization Protocol," 5th International Workshop on Network and Operating System Support for Digital Audio and Video, 1995, 13 pages.

Rothermel et al., "An Adaptive Stream Synchronization Protocol," 5th International Workshop on Network and Operating System Support for Digital Audio and Video, Apr. 18-21, 1995, 12 pages.

Rothermel et al., "Clock Hierarchies—An Abstraction for Grouping and Controlling Media Streams," University of Stuttgart Institute of Parallel and Distributed High-Performance Systems, Jan. 1996, 23 pages.

Rothermel et al., "Synchronization in Joint-Viewing Environments," University of Stuttgart Institute of Parallel and Distributed High-Performance Systems, 1992, 13 pages.

Rothermel, Kurt, "State-of-the-Art and Future Research in Stream Synchronization," University of Stuttgart, 3 pages.

"RVL-6 Modular Multi-Room Controller, Installation & Operation Guide," Nile Audio Corporations, 1999, 46 pages.

Schmandt et al., "Impromptu: Managing Networked Audio Applications for Mobile Users," 2004, 11 pages.

Schulzrinne et al., "RTP: A Transport Protocol for Real-Time Applications," Network Working Group, RFC: 3550, Standards Track, Jul. 2003, 104 pages.

Schulzrinne H., et al., "RTP: A Transport Protocol for Real-Time Applications, RFC 3550," Network Working Group, 2003, pp. 1-89.

Simple Network Time Protocol (SNTPI), RFC 1361 (Aug. 1992) (D+M_0397537-46) (10 pages).

Simple Network Time Protocol (SNTPII), RFC 1769 (Mar. 1995) (D+M_0397663-76) (14 pages).

Simple Service Discovery Protocol/1.0 Operating without an Arbiter (Oct. 28, 1999) (24 pages).

Sonos Controller for iPad Product Guide; copyright 2004-2013; 47 pages.

Sonos Digital Music System User Guide, Version: 050801, Aug. 2005, 114 pages.

Sonos, Inc. v. D&M Holdings, D&M Supp Opposition Brief including Exhibits, Mar. 17, 2017, 23 pages.

Sonos, Inc. v. D&M Holdings, Expert Report of Jay P. Kesan including Appendices A-P, Feb. 20, 2017, 776 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Complaint for Patent Infringement, filed Oct. 21, 2014, 20 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions, filed Sep. 14, 2016, 100 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidity Contentions, filed Apr. 15, 2016, 97 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Preliminary Identification of Indefinite Terms, provided Jul. 29, 2016, 8 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' 35 U.S.C. § 282 Notice filed Nov. 2, 2017, 31 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Answer, Defenses, and Counterclaims for Patent Infringement, filed Nov. 30, 2015, 47 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' Answer to Plaintiff's Second Amended Complaint, filed Apr. 30, 2015, 19 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' First Amended Answer to Plaintiff's Third Amended Complaint, filed Sep. 7, 2016, 23 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' Reply in Support of Partial Motion for Judgement on the Pleadings, filed Jun. 10, 2016, 15 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' First Amended Answer to Plaintiffs' Third Amended Complaint, provided Aug. 1, 2016, 26 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' Second Amended Answer to Plaintiffs' Third Amended Complaint, filed Sep. 9, 2016, 43 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' Second Amended Answer to Plaintiffs' Third Amended Complaint, provided Sep. 9, 2016, 88 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., First Amended Complaint for Patent Infringement, filed Dec. 17, 2014, 26 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Joint Claim Construction Chart, vol. 1 of 3 with Exhibits A-O, filed Aug. 17, 2016, 30 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Opening Brief in Support of Defendants' Partial Motion for Judgement on the Pleadings for Lack of Patent-Eligible Subject Matter, filed May 6, 2016, 27 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Plaintiff Sonos, Inc.'s Opening Claim Construction Brief, filed Sep. 9, 2016, 26 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Plaintiff Sonos, Inc.'s Response in Opposition to Defendants' Partial Motion for Judgment on the Pleadings, filed May 27, 2016, 24 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Reply Brief in Support of Defendants' Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Nov. 10, 2016, 16 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Reply Brief in Support of Defendants' Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Sep. 9, 2016, 16 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Second Amended Complaint for Patent Infringement, filed Feb. 27, 2015, 49 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Sonos's Motion to Strike Defendants' New Amended Answer Submitted with their Reply Brief, provided Sep. 15, 2016, 10 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Sonos's Opposition to Defendants' Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Oct. 31, 2016, 26 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Third Amended Complaint for Patent Infringement, filed Jan. 29, 2016, 47 pages.

US 10,469,966 B2

Page 16

(56) **References Cited**

OTHER PUBLICATIONS

Final Office Action dated Mar. 27, 2014, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 29 pages.

Final Office Action dated Jan. 28, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 21 pages.

Final Office Action dated Jun. 30, 2008, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 30 pages.

Final Office Action dated Jul. 1, 2016, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 11 pages.

Final Office Action dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 11 pages.

Final Office Action dated Aug. 3, 2015, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 13 pages.

Final Office Action dated Dec. 3, 2014, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 12 pages.

Final Office Action dated Jul. 3, 2012, issued in connection with U.S. Appl. No. 13/298,090, filed Nov. 16, 2011, 46 pages.

Final Office Action dated Jun. 3, 2016, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 24 pages.

Final Office Action dated Mar. 3, 2015, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 13 pages.

Final Office Action dated Mar. 4, 2015, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 16 pages.

Final Office Action dated Mar. 5, 2015, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 13 pages.

Final Office Action dated Jan. 7, 2017, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 14 pages.

Final Office Action dated Mar. 9, 2015, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 14 pages.

Final Office Action dated Aug. 10, 2015, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 26 pages.

Final Office Action dated Feb. 10, 2014, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 13 pages.

Final Office Action dated Aug. 11, 2015, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 15 pages.

Final Office Action dated Feb. 11, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 13 pages.

Final Office Action dated Feb. 11, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 17 pages.

Final Office Action dated Feb. 12, 2015, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 17, 2014, 20 pages.

Final Office Action dated Apr. 13, 2017, issued in connection with U.S. Appl. No. 14/563,515, filed Dec. 8, 2014, 13 pages.

Final Office Action dated Dec. 13, 2016, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 14 pages.

Final Office Action dated Oct. 13, 2011, issued in connection with U.S. Appl. No. 11/853,790, filed Sep. 11, 2007, 10 pages.

Final Office Action dated Oct. 13, 2011, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 10 pages.

Final Office Action dated Nov. 14, 2018, issued in connection with U.S. Appl. No. 15/130,919, filed Apr. 15, 2016, 12 pages.

Final Office Action dated Jul. 15, 2015, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 18 pages.

Final Office Action dated Jun. 15, 2015, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 25 pages.

Final Office Action dated Dec. 17, 2014, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 36 pages.

Final Office Action dated Oct. 19, 2016, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 14 pages.

Final Office Action dated Jan. 21, 2010, issued in connection with U.S. Appl. No. 11/906,702, filed Oct. 2, 2007, 27 pages.

Final Office Action dated Oct. 22, 2014, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 12 pages.

Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 23 pages.

Final Office Action dated Feb. 24, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Mar. 26, 2013, 28 pages.

Final Office Action dated May 25, 2016, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 33 pages.

Final Office Action dated Apr. 28, 2015, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 20 pages.

Final Office Action dated Jun. 29, 2015, issued in connection with U.S. Appl. No. 14/465,457, filed Aug. 21, 2014, 13 pages.

Final Office Action dated Jan. 3, 2019, issued in connection with U.S. Appl. No. 15/405,931, filed Jan. 13, 2017, 16 pages.

Final Office Action dated Nov. 30, 2015, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 26 pages.

Final Office Action dated Apr. 6, 2017, issued in connection with U.S. Appl. No. 14/620,937, filed Feb. 12, 2015, 15 pages.

Final Office Action dated Dec. 7, 2017, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 11 pages.

Fireball DVD and Music Manager DVDM-100 Installation and User's Guide, Copyright 2003, 185 pages.

Fireball MP-200 User's Manual, Copyright 2006, 93 pages.

Fireball Remote Control Guide WD006-1-1, Copyright 2003, 19 pages.

Fireball SE-D1 User's Manual, Copyright 2005, 90 pages.

First Action Interview Office Action Summary dated Apr. 15, 2015, issued in connection with U.S. Appl. No. 14/505,027, filed Oct. 2, 2014, 6 pages.

Fober et al., "Clock Skew Compensation over a High Latency Network," Proceedings of the ICMC, 2002, pp. 548-552.

Fries et al., "The MP3 and Internet Audio Handbook: Your Guide to the Digital Music Revolution." 2000, 320 pages.

Fulton et al., "The Network Audio System: Make Your Application Sing (as Well as Dance)!" The X Resource, 1994, 14 pages.

Gaston et al., "Methods for Sharing Stereo and Multichannel Recordings Among Planetariums," Audio Engineering Society Convention Paper 7474, 2008, 15 pages.

General Event Notification Architecture Base: Client to Arbiter (Apr. 2000) (23 pages).

Sony: AIR-SA 50R Wireless Speaker, Copyright 2009, 2 pages.

Sony: Altus Quick Setup Guide ALT-SA32PC, Copyright 2009, 2 pages.

Sony: BD/DVD Home Theatre System Instruction for BDV-E300, E301 and E801, Copyright 2009, 115 pages.

Sony: BD/DVD Home Theatre System Operating Instructions for BDV-IT1000/BDV-IS1000, Copyright 2008, 159 pages.

Sony: Blu-ray Disc/DVD Home Theatre System Operating Instructions for BDV-IZ1000W, Copyright 2010, 88 pages.

Sony: DVD Home Theatre System Operating Instructions for DAV-DZ380W/DZ680W/DZ880W, Copyright 2009, 136 pages.

Sony: DVD Home Theatre System Operating Instructions for DAV-DZ870W, Copyright 2008, 128 pages.

Sony Ericsson MS500 User Guide, Copyright 2009, 2 pages.

Sony: Home Theatre System Operating Instructions for HT-IS100, Copyright 2008, 168 pages.

Sony HT-IS100, 5.1 Channel Audio System, last updated Nov. 2009, 2 pages.

Sony: Multi Channel AV Receiver Operating Instructions, 2007, 80 pages.

Sony: Multi Channel AV Receiver Operating Instructions for STR-DN1000, Copyright 2009, 136 pages.

Sony: STR-DN1000, Audio Video Receiver, last updated Aug. 2009, 2 pages.

Sony: Wireless Surround Kit Operating Instructions for WHAT-SA2, Copyright 2010, 56 pages.

Taylor, Marilou, "Long Island Sound," Audio Video Interiors, Apr. 2000, 8 pages.

Third Party Request for Ex Parte Re-Examination, U.S. Appl. No. 90/013,859 filed Nov. 7, 2016, 424 pages.

TOA Corporation, Digital Processor DP-0206 DACsys2000 Version 2.00 Software Instruction Manual, Copyright 2001, 67 pages.

Understanding Universal Plug and Play, Microsoft White Paper (Jun. 2000) (D+M_0402074-118) (45 pages).

United States Patent and Trademark Office, U.S. Appl. No. 60/490,768, filed Jul. 28, 2003, entitled "Method for synchronizing audio playback between multiple networked devices," 13 pages.

United States Patent and Trademark Office, U.S. Appl. No. 60/825,407, filed Sep. 12, 2006, entitled "Controlling and manipulating groupings in a multi-zone music or media system," 82 pages.

US 10,469,966 B2

Page 17

(56)

References Cited

OTHER PUBLICATIONS

Universal Plug and Play Device Architecture V. 1.0, (Jun. 8, 2000) (54 pages).

Universal Plug and Play in Windows XP, Tom Fout. Microsoft Corporation (Jul. 2001) (D+M_0402041-73) (33 pages).

Universal Plug and Play ("UPnP") AV Architecture:1 for UPnP, Version 1.0, (Jun. 25, 2002) (D+M_0298151-72) (22 pages).

Universal Plug and Play Vendor's Implementation Guide (Jan. 5, 2000) (7 pages).

UPnP AV Architecture:0.83 (Jun. 12, 2002) (SONDM000115483-504) (22 pages).

UPnP Design by Example, A Software Developers Guide to Universal Plug and Play Michael Jeronimo and JackWeast, Intel Press (D+M_0401307-818) (Apr. 2003) (511 pages).

UPnP; "Universal Plug and Play Device Architecture," Jun. 8, 2000; version 1.0; Microsoft Corporation; pp. 1-54.

U.S. Appl. No. 13/083,499, filed Apr. 8, 2011, "Multi-Channel Pairing in a Media System."

WANCommonInterfaceConfig:1 Service Template Version 1.01 for UPnP, Ver. 1.0 (Nov. 12, 2001) (D+M_0401820-43) (24 pages).

WANIPConnection:1 Service Template Version 1.01 for UPnP Ver. 1.0 (Nov. 12, 2001) (D+M_0401844-917) (74 pages).

WANPPPConnection:1 Service Template Version 1.01 for UPnP, Version 1.0 (Nov. 12, 2001) (D+M_0401918-2006) (89 pages).

WaveLan High-Speed Multimode Chip Set, AVAGO0003, Agere Systems, Feb. 2003, 4 pages.

WaveLan High-Speed Multimode Chip Set, AVAGO0005, Agere Systems, Feb. 2003, 4 pages.

WaveLAN Wireless Integration Developer Kit (WI-DK) for Access Point Developers, AVAGO0054, Agere Systems, Jul. 2003, 2 pages.

WaveLAN Wireless Integration-Developer Kit (WI-DK) Hardware Control Function (HCF), AVAGO0052, Agere Systems, Jul. 2003, 2 pages.

"Welcome. You're watching Apple TV." Apple TV 1st Generation Setup Guide, Apr. 8, 2008 Retrieved Oct. 14, 2014, 40 pages.

"Welcome. You're watching Apple TV." Apple TV 2nd Generation Setup Guide, Mar. 10, 2011 Retrieved Oct. 16, 2014, 36 pages.

"Welcome. You're watching Apple TV." Apple TV 3rd Generation Setup Guide, Mar. 16, 2012 Retrieved Oct. 16, 2014, 36 pages.

WI-DK Release 2 WaveLan Embedded Drivers for VxWorks and Linux, AVAGO0056, Agere Systems, Jul. 2003, 2 pages.

WI-DK Release 2 WaveLan END Reference Driver for VxWorks, AVAGO0044, Agere Systems, Jul. 2003, 4 pages.

WI-DK Release 2 WaveLan LKM Reference Drivers for Linux, AVAGO0048, Agere Systems, Jul. 2003, 4 pages.

Windows Media Connect Device Compatibility Specification (Apr. 12, 2004) (16 pages).

WPA Reauthentication Rates, AVAGO0063, Agere Systems, Feb. 2004, 3 pages.

Yamaha DME 32 manual: copyright 2001.

Yamaha DME 64 Owner's Manual; copyright 2004, 80 pages.

Yamaha DME Designer 3.5 setup manual guide; copyright 2004, 16 pages.

Yamaha DME Designer 3.5 User Manual; Copyright 2004, 507 pages.

Yamaha DME Designer software manual: Copyright 2004, 482 pages.

"Symantec pcAnywhere User's Guide," v 10.5.1, 1995-2002, 154 pages.

"Systemline Modular Installation Guide, Multiroom System," Systemline, 2003, pp. 1-22.

"884+ Automatic Matrix Mixer Control System," Ivie Technologies, Inc., 2000, pp. 1-4.

Advanced Driver Tab User Interface WaveLan GUI Guide, AVAGO0009, Agere Systems, Feb. 2004, 4 pages.

Advisory Action dated Feb. 2, 2016, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 8 pages.

Advisory Action dated Sep. 18, 2008, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 8 pages.

Advisory Action dated Feb. 1, 2016, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 6 pages.

Advisory Action dated Jun. 1, 2015, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 11 pages.

Advisory Action dated Mar. 2, 2015, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 3 pages.

Advisory Action dated Jan. 5, 2012, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 3 pages.

Advisory Action dated Oct. 5, 2015, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 4 pages.

Advisory Action dated Sep. 5, 2014, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 3 pages.

Advisory Action dated Oct. 6, 2016, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 4 pages.

Advisory Action dated Jan. 8, 2015, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 4 pages.

Advisory Action dated Jun. 9, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 25, 2013, 3 pages.

Advisory Action dated Feb. 10, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 3 pages.

Advisory Action dated Nov. 12, 2014, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 6 pages.

Advisory Action dated Apr. 15, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 9 pages.

Advisory Action dated Apr. 15, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 9 pages.

Advisory Action dated Dec. 22, 2011, issued in connection with U.S. Appl. No. 11/853,790, filed Sep. 11, 2007, 2 pages.

Advisory Action dated Mar. 25, 2015, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 5 pages.

Advisory Action dated Feb. 26, 2015, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 3 pages.

Advisory Action dated Nov. 26, 2014, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 9 pages.

Advisory Action dated Jul. 28, 2015, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 7 pages.

Advisory Action dated Sep. 28, 2009, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 4 pages.

Agere Systems' Voice-over-Wireless LAN (VoWLAN) Station Quality of Service, AVAGO0015, Agere Systems, Jan. 2005, 5 pages.

Akyildiz et al., "Multimedia Group Synchronization Protocols for Integrated Services Networks," IEEE Journal on Selected Areas in Communications, 1996 pp. 162-173, vol. 14, No. 1.

Anonymous, "Information technology—Generic coding of moving pictures and associated audio information—Part 3: Audio," ISO/IEC 13818-3, Apr. 1998, pp. 11.

Anonymous, "Transmission Control Protocol," RFC: 793, USC/Information Sciences Institute, Sep. 1981, 91 pages.

Audio Authority: How to Install and Use the Model 1154 Signal Sensing Auto Selector, 2002, 4 pages.

Audio Authority: Model 1154B High Definition AV Auto Selector, 2008, 8 pages.

AudioSource: AMP 100 User Manual, 2003, 4 pages.

AudioTron Quick Start Guide, Version 1.0, Mar. 2001, 24 pages.

AudioTron Reference Manual, Version 3.0, May 2002, 70 pages.

AudioTron Setup Guide, Version 3.0, May 2002, 38 pages.

Automatic Profile Hunting Functional Description, AVAGO0013, Agere Systems, Feb. 2004, 2 pages.

"A/V Surround Receiver AVR-5800," Denon Electronics, 2000, 2 pages.

"A/V System Controleer, Owner's Manual," B&K Components, Ltd., 1998, 52 pages.

AVTransport:1 Service Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (66 pages).

AXIS Communication: AXIS P8221 Network I/O Audio Module, 2009, 41 pages.

Baldwin, Roberto. "How-To: Setup iTunes DJ on Your Max and iPhone", available at http://www.maclife.com/article/howtos/howto_setup_itunes_dj_your_mac_and_iphone, archived on Mar. 3, 2009, 4 pages.

Balfanz et al., "Network-in-a-Box: How to Set Up a Secure Wireless Network in Under a Minute," 13th USENIX Security Symposium—Technical Paper, 2002, 23 pages.

US 10,469,966 B2

Page 18

(56)

References Cited

OTHER PUBLICATIONS

Balfanz et al., "Talking to Strangers: Authentication in Ad-Hoc Wireless Networks," Xerox Palo Alto Research Center, 2002, 13 pages.

Barham et al., "Wide Area Audio Synchronisation," University of Cambridge Computer Laboratory, 1995, 5 pages.

Baudisch et al., "Flat Volume Control: Improving Usability by Hiding the Volume Control Hierarchy in the User Interface," 2004, 8 pages.

Benslimane Abderrahim, "A Multimedia Synchronization Protocol for Multicast Groups," Proceedings of the 26th Euromicro Conference, 2000, pp. 456-463, vol. 1.

Biersack et al., "Intra- and Inter-Stream Synchronization for Stored Multimedia Streams," IEEE International Conference on Multimedia Computing and Systems, 1996, pp. 372-381.

Blakowski G. et al., "A Media Synchronization Survey: Reference Model, Specification, and Case Studies," Jan. 1996, pp. 5-35, vol. 14, No. 1.

Bluetooth. "Specification of the Bluetooth System: The ad hoc SCATTERNET for affordable and highly functional wireless connectivity," Core, Version 1.0 A, Jul. 26, 1999, 1068 pages.

Bluetooth. "Specification of the Bluetooth System: Wireless connections made easy," Core, Version 1.0 B, Dec. 1, 1999, 1076 pages.

Bogen Communications, Inc., ProMatrix Digitally Matrixed Amplifier Model PM3180, Copyright 1996, 2 pages.

Brassil et al., "Enhancing Internet Streaming Media with Cueing Protocols," 2000, 9 pages.

Breebaart et al., "Multi-Channel Goes Mobile: MPEG Surround Binaural Rendering," AES 29th International Conference, Sep. 2-4, 2006, pp. 1-13.

Bretl W.E., et al., MPEG2 Tutorial [online], 2000 [retrieved on Jan. 13, 2009] Retrieved from the Internet: (<http://www.bretl.com/mpeghtml/MPEGIndex.htm>), pp. 1-23.

Buerk et al., "AVTransport:1 Service Template Version 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 67 pages.

Canadian Intellectual Property Office, Canadian Office Action dated Apr. 4, 2016, issued in connection with Canadian Patent Application No. 2,842,342, 5 pages.

Canadian Intellectual Property Office, Canadian Office Action dated Sep. 14, 2015, issued in connection with Canadian Patent Application No. 2,842,342, 2 pages.

Canadian Patent Office, Canadian Office Action dated Aug. 30, 2017, issued in connection with CA Application No. 2947275, 5 pages.

Canadian Patent Office, Office Action dated Apr. 10, 2015, issued in connection with Canadian Patent Application No. 2,832,542, 3 pages.

Cen et al., "A Distributed Real-Time MPEG Video Audio Player," Department of Computer Science and Engineering, Oregon Graduate Institute of Science and Technology, 1995, 12 pages.

Chakrabarti et al., "A Remotely Controlled Bluetooth Enabled Environment," IEEE, 2004, pp. 77-81.

Change Notification: Agere Systems WaveLan Multimode Reference Design (D2 to D3), AVAGO0042, Agere Systems, Nov. 2004, 2 pages.

Chinese Patent Office, First Office Action dated Oct. 12, 2018, issued in connection with Chinese Application No. 201610804134.8, 10 pages.

Chinese Patent Office, Office Action dated Jul. 5, 2016, issued in connection with Chinese Patent Application No. 201380044380.2, 25 pages.

Chinese Patent Office, Office Action dated Nov. 27, 2015, issued in connection with Chinese Patent Application No. 201280028038.9, 26 pages.

Connection Manager: 1 Service Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (25 pages).

ContentDirectory:1 Service Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (89 pages).

Corrected Notice of Allowance dated Mar. 12, 2015, issued in connection with U.S. Appl. No. 13/630,565, filed Sep. 28, 2012, 4 pages.

Corrected Notice of Allowance dated Aug. 19, 2015, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 2 pages.

Corrected Notice of Allowance dated Oct. 30, 2015, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 2 pages.

Corrected Notice of Allowance dated Dec. 6, 2017, issued in connection with U.S. Appl. No. 15/228,685, filed Aug. 4, 2016, 5 pages.

Creative, "Connecting Bluetooth Devices with Creative D200," <http://support.creative.com/kb/ShowArticle.aspx?url=http://ask.creative.com:80/SRVS/CGI-BIN/WEB CGI.EXE/./?St=106,E=000000000396859016,K=9377,Sxi=8,VARSET=ws:http://us.creative.com,case=63350>, available on Nov. 28, 2011, 2 pages.

Crown PIP Manual available for sale at least 2004, 68 pages.

Dannenberg et al., "A. System Supporting Flexible Distributed Real-Time Music Processing," Proceedings of the 2001 International Computer Music Conference, 2001, 4 pages.

Dannenberg, Roger B., "Remote Access to Interactive Media," Proceedings of the SPIE 1785, 1993, pp. 230-237.

Day, Rebecca, "Going Elan!" Primedia Inc., 2003, 4 pages.

Deep-Sleep Implementation in WL60011 for IEEE 802.11b Applications, AVAGO0020, Agere Systems, Jul. 2004, 22 pages.

Dell, Inc. "Dell Digital Audio Receiver: Reference Guide," Jun. 2000, 70 pages.

Dell, Inc. "Start Here," Jun. 2000, 2 pages.

"Denon 2003-2004 Product Catalog," Denon, 2003-2004, 44 pages.

Denon AV Surround Receiver AVR-1604/684 User's Manual, 2004, 128 pages.

Denon AV Surround Receiver AVR-5800 Operating Instructions, Copyright 2000, 67 pages.

Designing a UPnP AV MediaServer, Nelson Kidd (2003) (SONDM000115062-116) (55 pages).

Dorwaldt, Carl, "EASE 4.1 Tutorial," Renkus-Heinz, Inc., 2004, 417 pages.

"DP-0206 Digital Signal Processor," TOA Electronics, Inc., 2001, pp. 1-12.

Dynaudio Acoustics Air Series, <http://www.soundonsound.com/sos/sep02/articles/dynaudioair.asp>, 2002, 4 pages.

European Patent Office, European Extended Search Report dated Mar. 7, 2016, issued in connection with EP Application No. 13810340.3, 9 pages.

European Patent Office, European Extended Search Report dated Feb. 28, 2014, issued in connection with EP Application No. 13184747.7, 8 pages.

European Patent Office, European Extended Search Report dated Mar. 31, 2015, issued in connection with EP Application No. 14181454.1, 9 pages.

European Patent Office, European Search Report dated Jul. 5, 2016, issued in connection with European Patent Application No. 16156935.5, 9 pages.

European Patent Office, Examination Report dated Mar. 22, 2016, issued in connection with European Patent Application No. EP14181454.1, 6 pages.

European Patent Office, Examination Report dated Oct. 24, 2016, issued in connection with European Patent Application No. 13808623.6, 4 pages.

European Patent Office, Extended European Search Report dated Jul. 5, 2016, issued in connection with European Patent Application No. 16156940.5, 7 pages.

Falcone, John, "Sonos BU150 Digital Music System review," CNET, CNET [online] Jul. 27, 2009 [retrieved on Mar. 16, 2016], 11 pages Retrieved from the Internet: URL:<http://www.cnet.com/products/sonos-bu150-digital-music-system/>.

Faller, Christof, "Coding of Spatial Audio Compatible with Different Playback Formats," Audio Engineering Society Convention Paper (Presented at the 117th Convention), Oct. 28-31, 2004, 12 pages.

File History of Re-Examination Application No. 90/013,423.

US 10,469,966 B2

Page 19

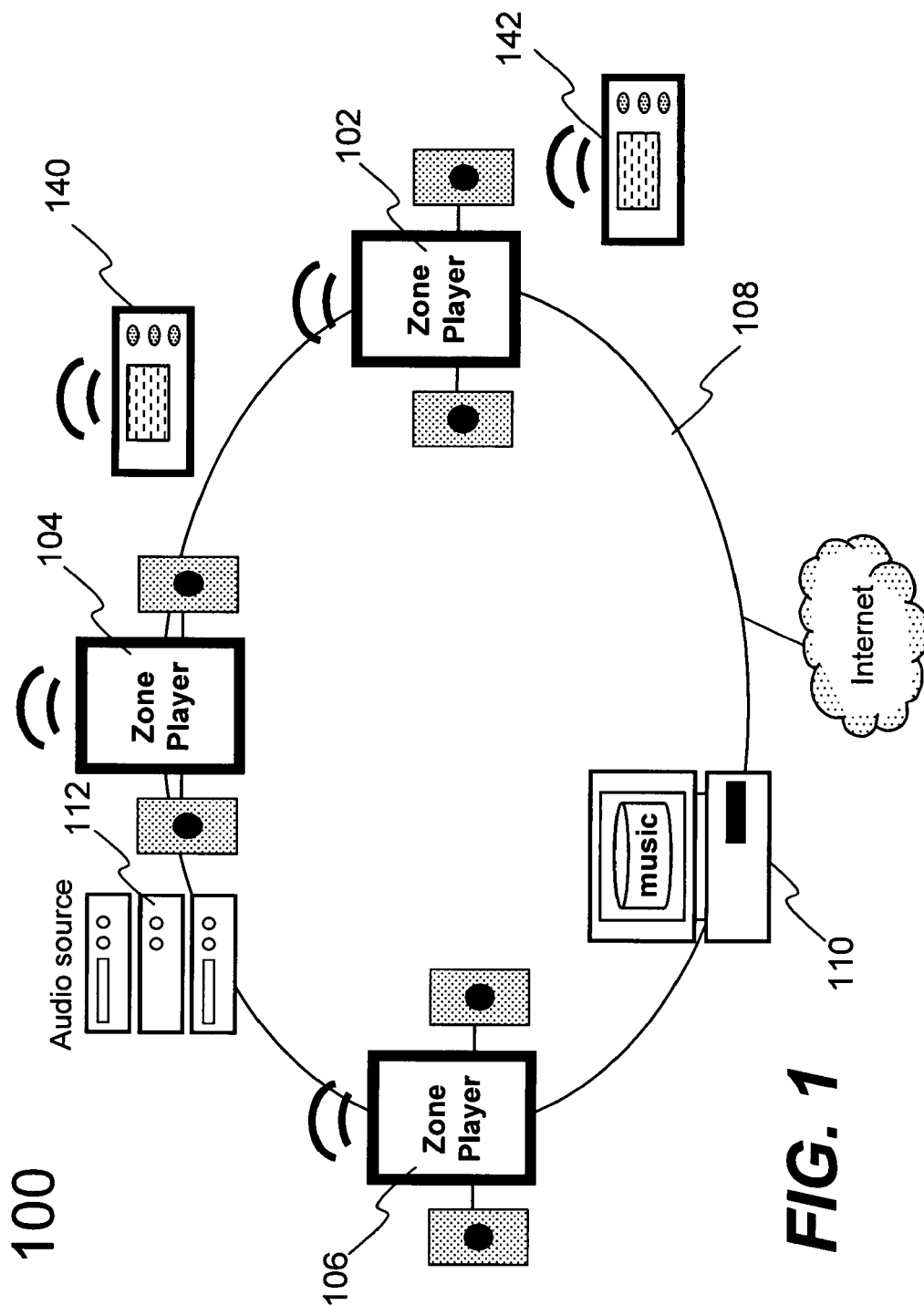
(56)

References Cited

OTHER PUBLICATIONS

Final Office Action dated Jun. 5, 2014, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 12 pages.
Final Office Action dated Jul. 13, 2009, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 16 pages.
Final Office Action dated Sep. 13, 2012, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 17 pages.
Final Office Action dated Nov. 18, 2015, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 56 pages.
Final Office Action dated Oct. 21, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 19 pages.
Final Office Action dated Jul. 23, 2014, issued in connection with U.S. Appl. No. 13/896,037, filed May 16, 2013, 12 pages.
AuviTran AVB32-ES User's Manual, 2005, 25 pages.
AuviTran AVKIT-ES for AD8HR User's Manual, 2005, 15 pages.
CobraNet Manager, Direct control over your audio network. www.peakaudio.com/CobraNet/FAQ.html, 2005 [retrieved online Jul. 12, 2019 at web.archive.org/web/20050403214230/http://www.peakaudio.com/CobraNet/FAQ] 13 pages.
Non-Final Office Action dated Jul. 17, 2019, issued in connection with U.S. Appl. No. 15/130,919, filed Apr. 15, 2016, 15 pages.
Non-Final Office Action dated Aug. 28, 2019, issued in connection with U.S. Appl. No. 16/422,160, filed May 24, 2019, 14 pages.
Non-Final Office Action dated Jul. 5, 2019, issued in connection with U.S. Appl. No. 16/383,561, filed Apr. 12, 2019, 12 pages.

* cited by examiner



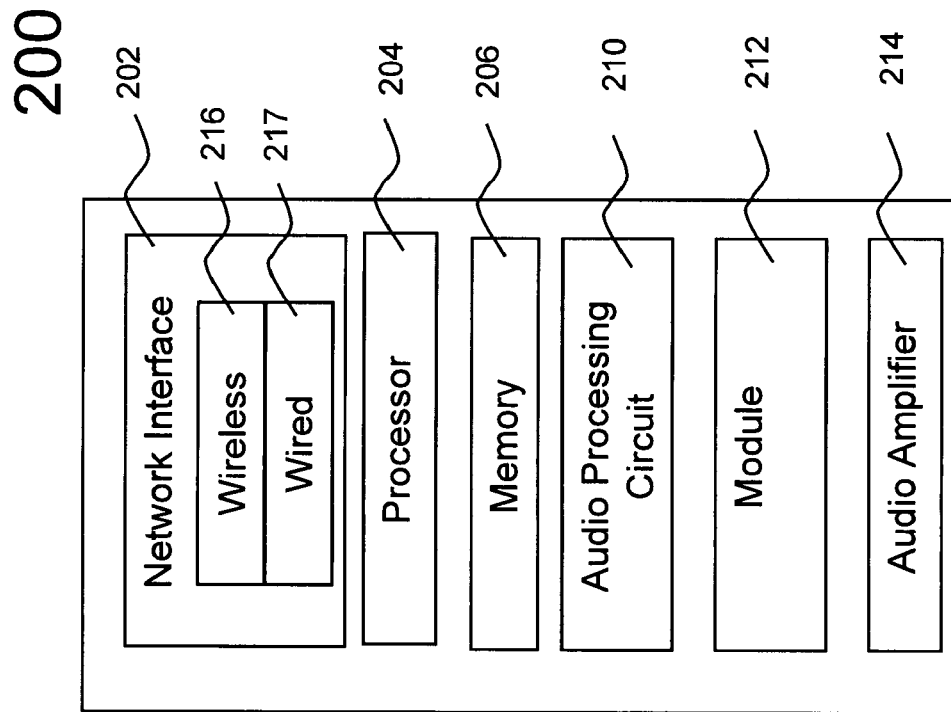
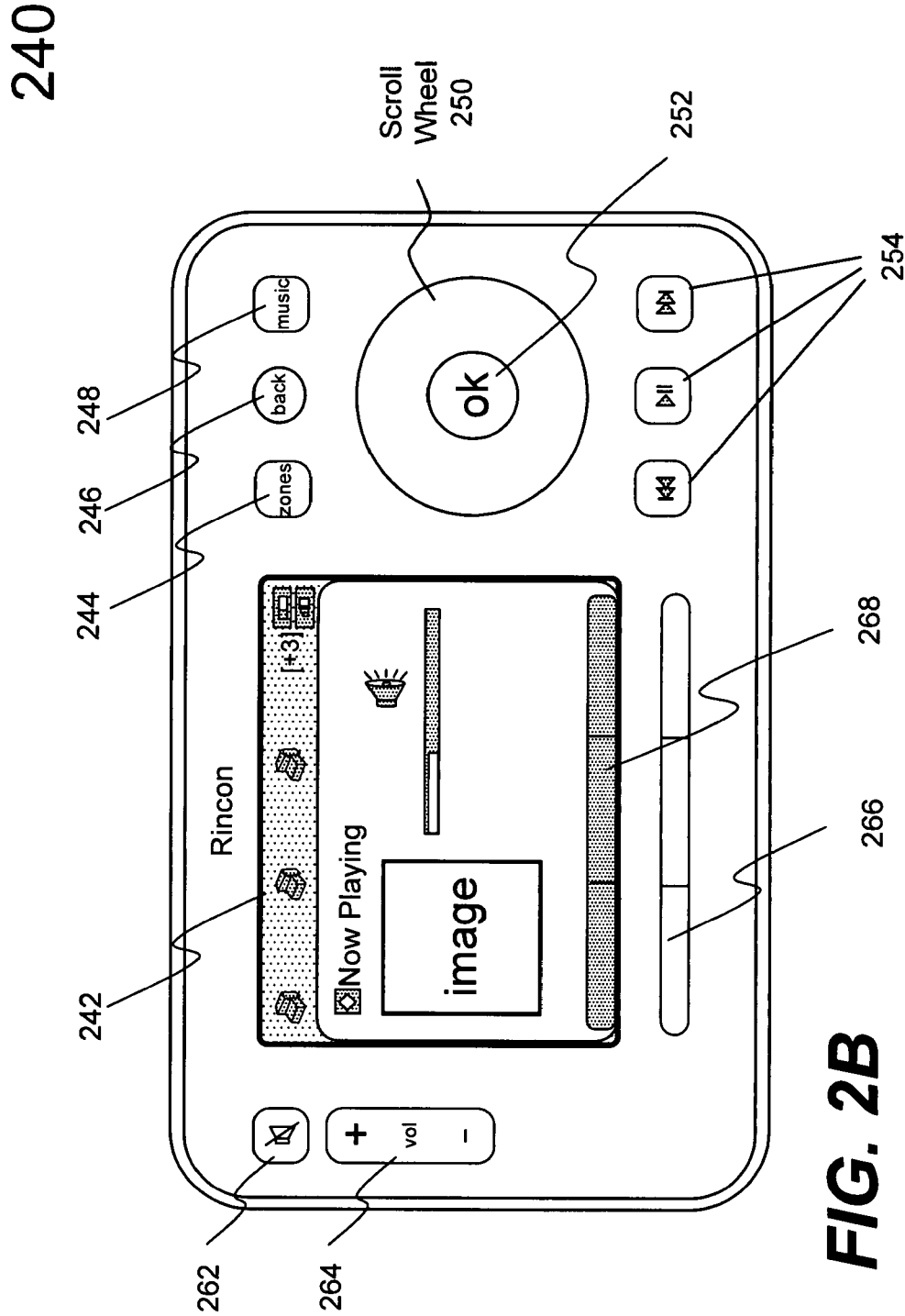


FIG. 2A



270

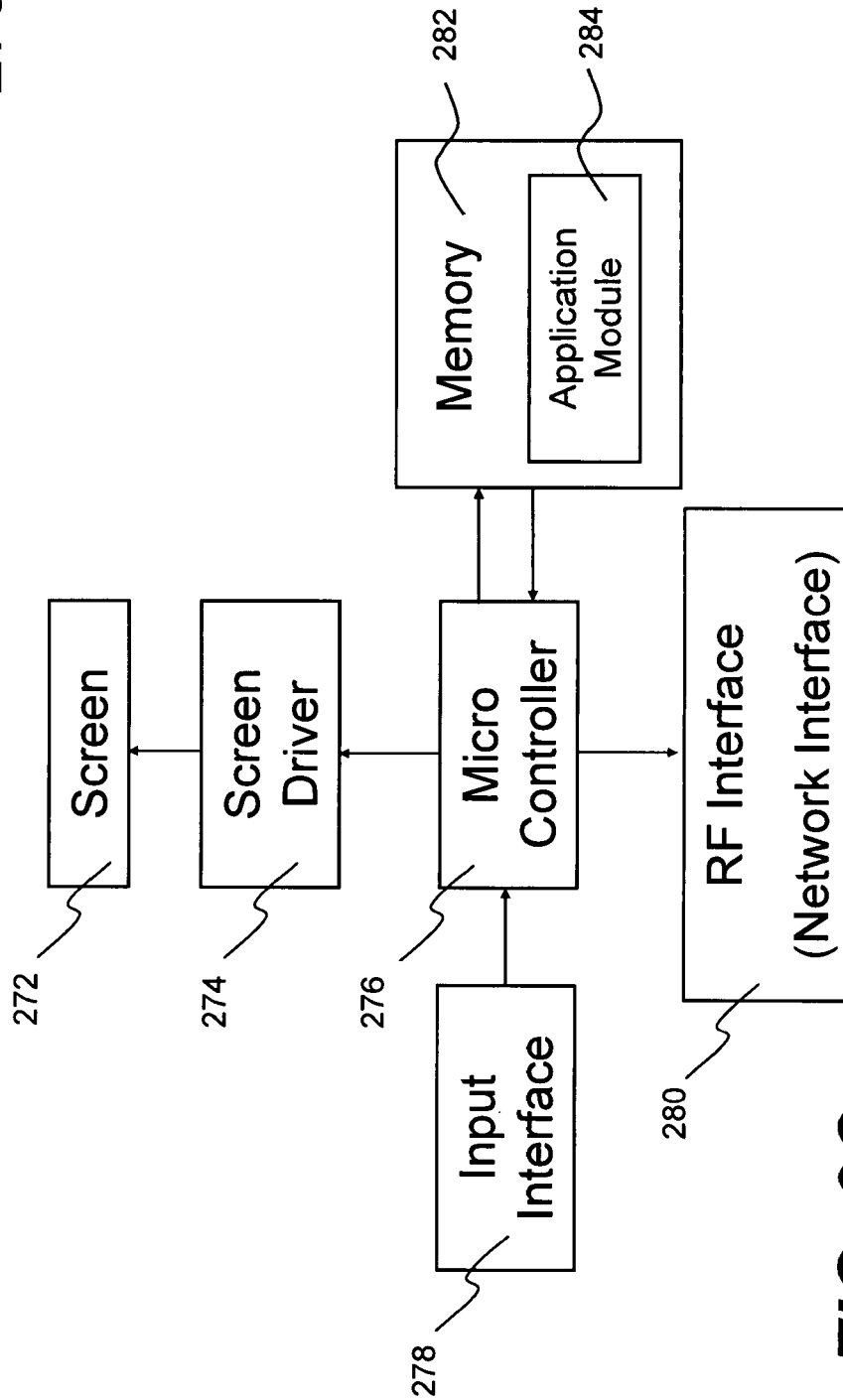
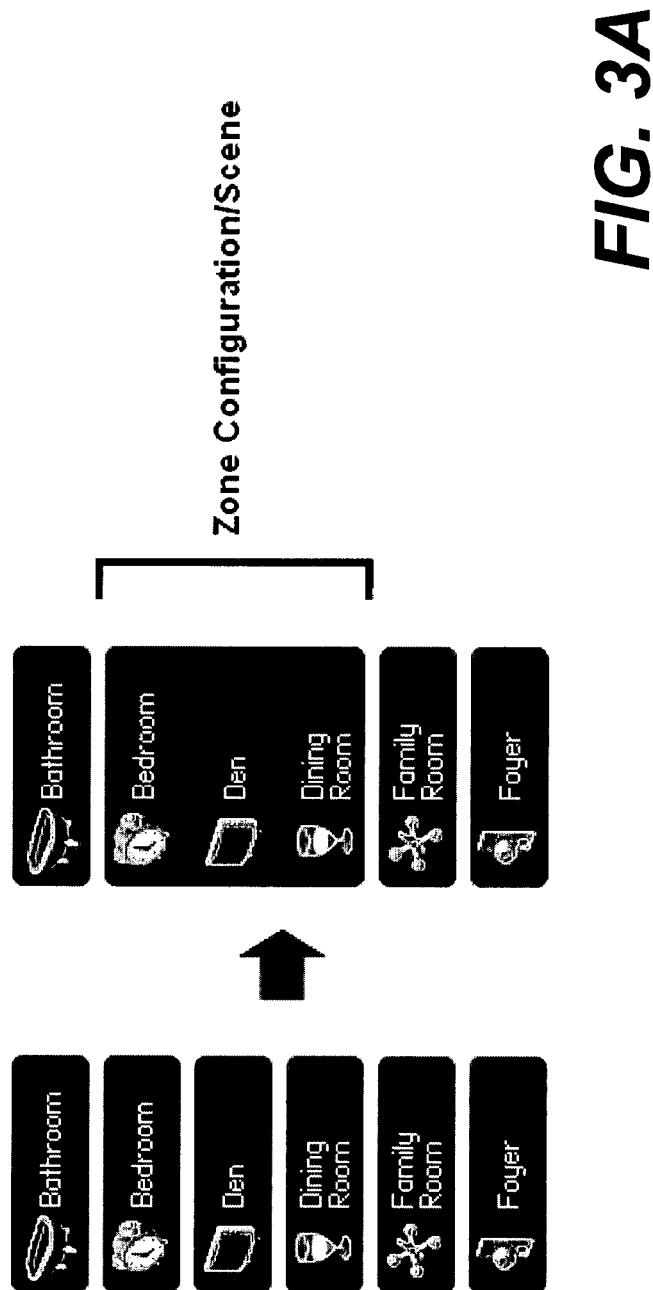


FIG. 2C



U.S. Patent

Nov. 5, 2019

Sheet 6 of 13

US 10,469,966 B2

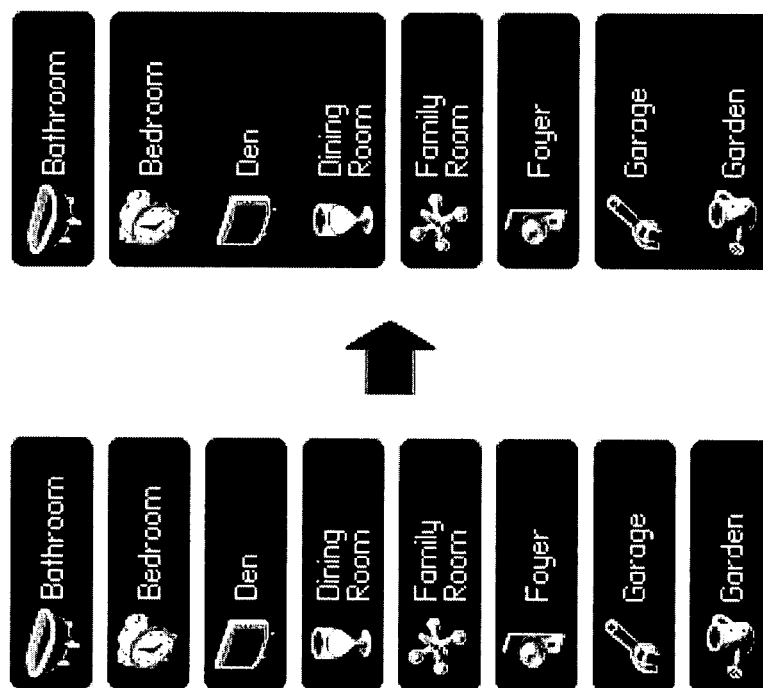
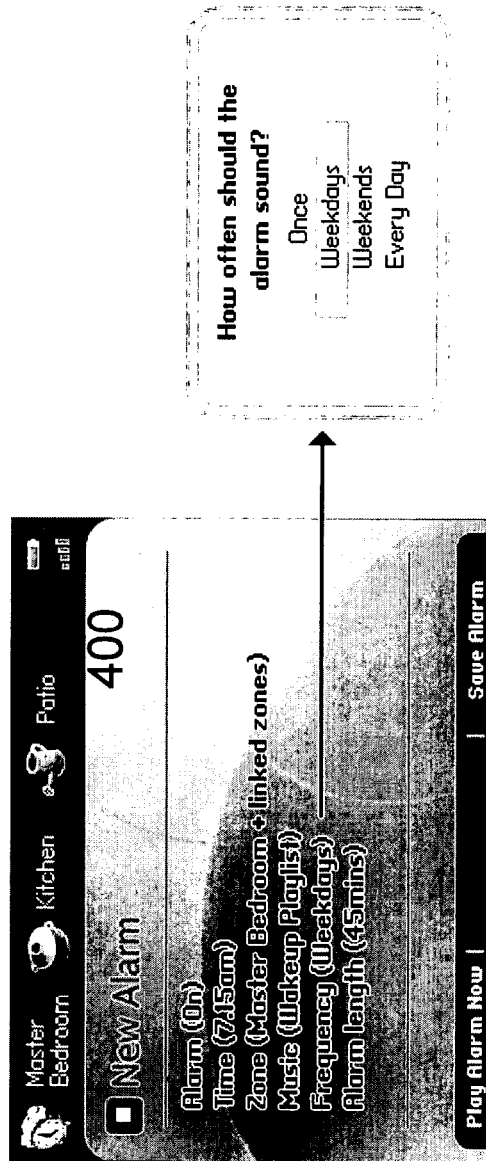


FIG. 3B



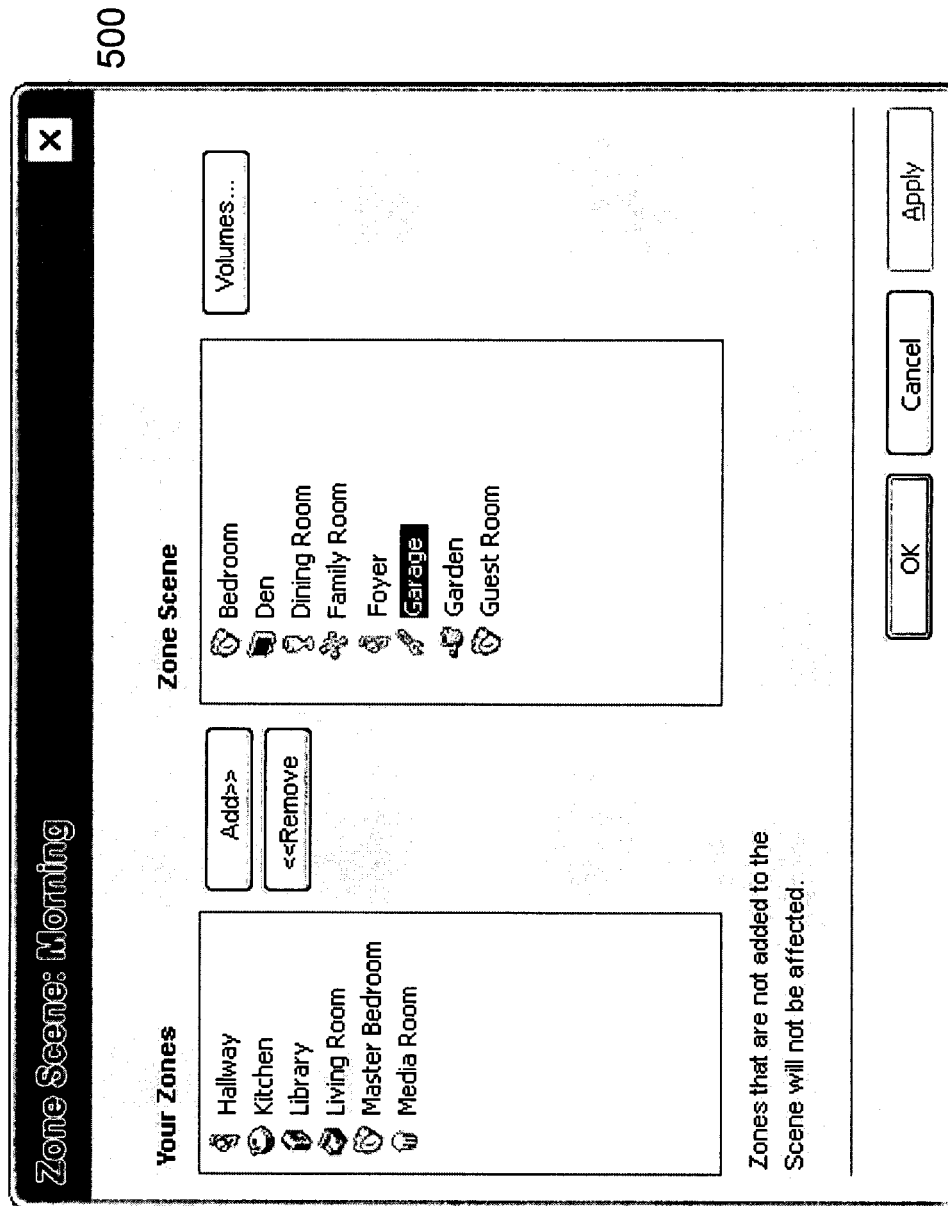


FIG. 5A

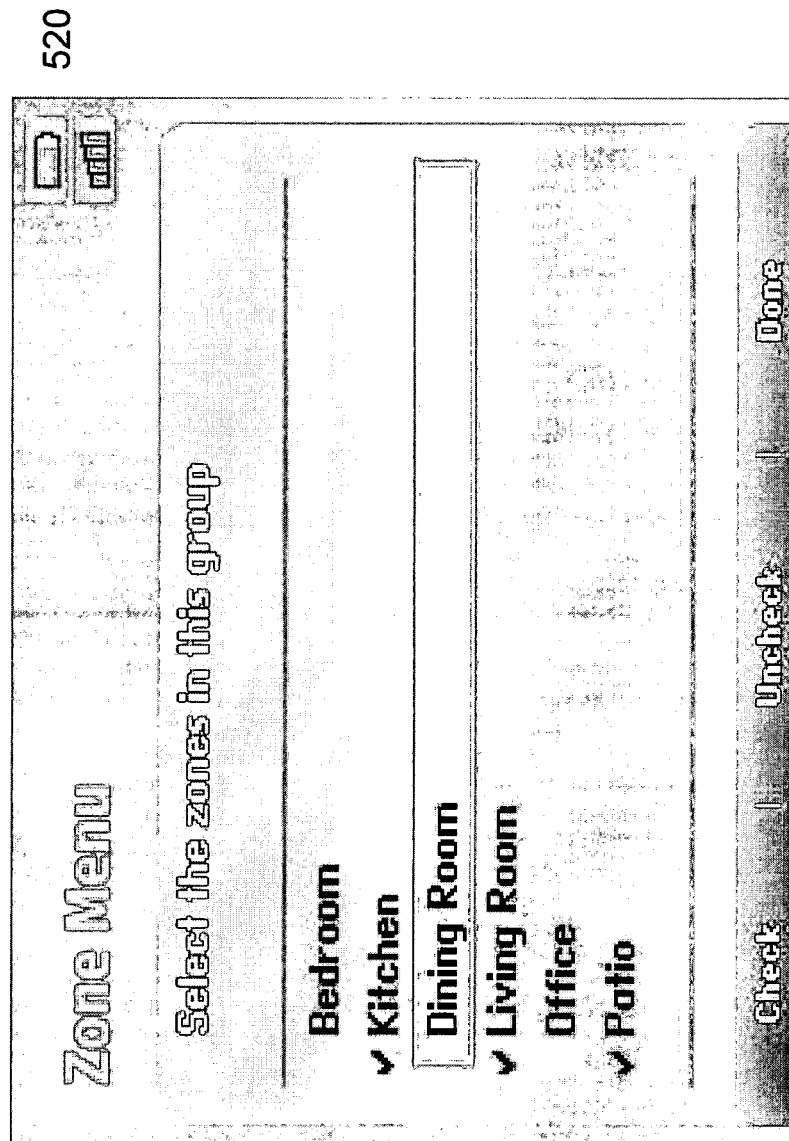


FIG. 5B

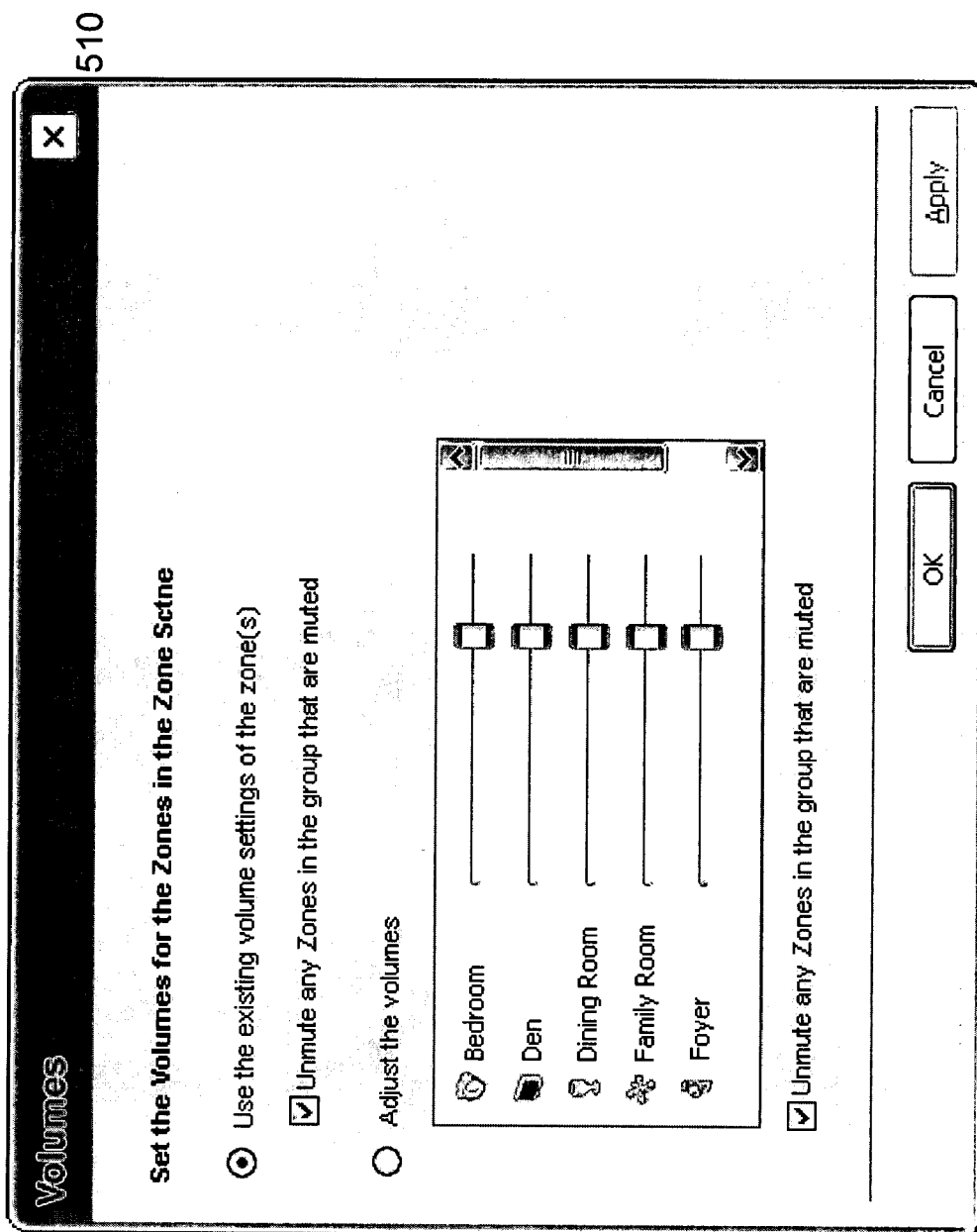


FIG. 5C

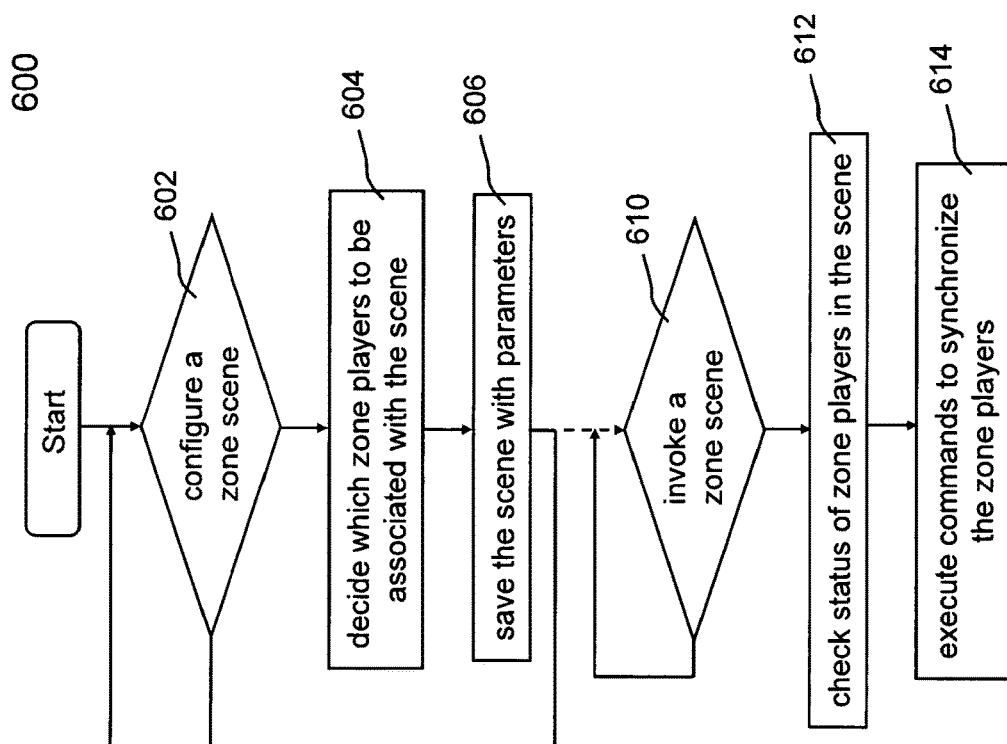


FIG. 6

U.S. Patent

Nov. 5, 2019

Sheet 12 of 13

US 10,469,966 B2

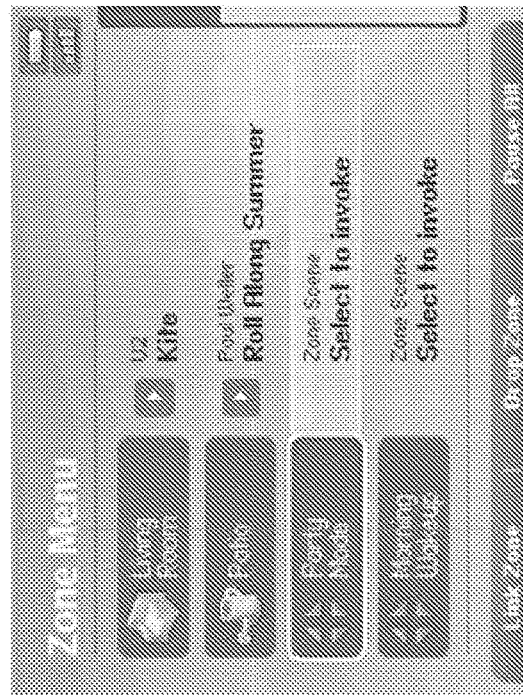


FIG. 7

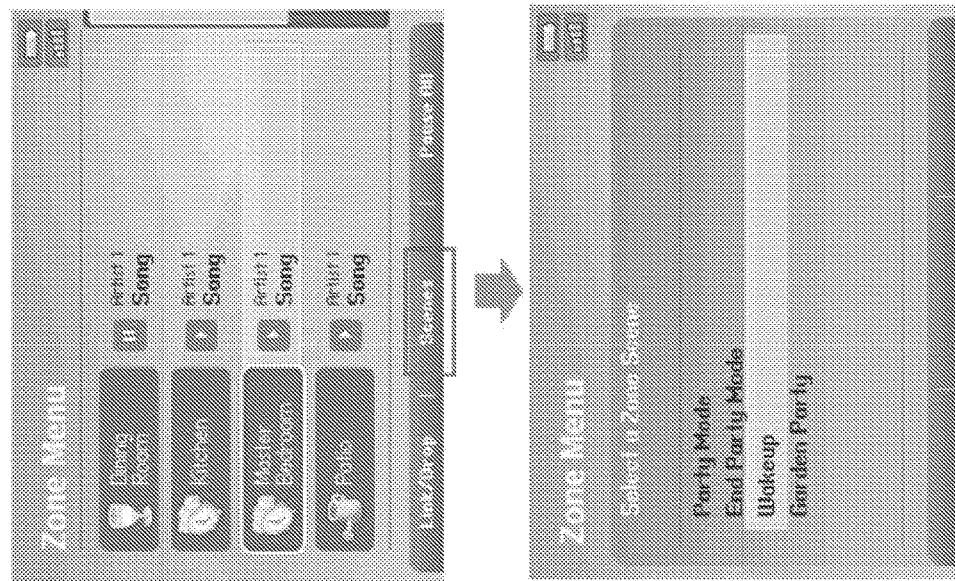


FIG. 8

US 10,469,966 B2

1

ZONE SCENE MANAGEMENT**CROSS REFERENCE TO RELATED APPLICATIONS**

This application is a continuation of and claims priority to U.S. patent application Ser. No. 15/130,919, filed on Apr. 15, 2016, entitled "ZONE SCENE ACTIVATION," which is a continuation of U.S. patent application Ser. No. 14/465,457, filed on Aug. 21, 2014, entitled "METHOD AND APPARATUS FOR UPDATING ZONE CONFIGURATIONS IN A MULTI-ZONE SYSTEM," which is a continuation of U.S. patent application Ser. No. 13/896,829, filed on May 17, 2013, entitled "METHOD AND APPARATUS FOR UPDATING ZONE CONFIGURATIONS IN A MULTI-ZONE SYSTEM," which is a continuation of U.S. patent application Ser. No. 11/853,790, filed Sep. 11, 2007, entitled "CONTROLLING AND MANIPULATING GROUPINGS IN A MULTI-ZONE MEDIA SYSTEM," which claims priority to U.S. Provisional Application No. 60/825,407 filed on Sep. 12, 2006, entitled "CONTROLLING AND MANIPULATING GROUPINGS IN A MULTI-ZONE MEDIA SYSTEM," each of which is hereby incorporated by reference in its entirety for all purposes.

BACKGROUND OF THE INVENTION**Field of the Invention**

The invention is generally related to the area of consumer electronics and human-computer interaction. In particular, the invention is related to method and apparatus for controlling or manipulating a plurality of multimedia players in a multi-zone system.

An enduring passion for quality audio reproduction or system is continuing to drive demands from users. One of the demands includes an audio system in a house in which, for example, one could grill to classic rock on a patio while another one may cook up his/her own music selections in a kitchen. This is all at the same time while a teenager catches a ballgame in a family room, and another one blasts pop in a bedroom. And the best part of such audio system is that each family member does not need his or her own stereo system—one system gives everyone access to all the music sources.

Currently, one of the systems that can meet part of such demand is a conventional multi-zone audio system that usually includes a number of audio players. Each of the audio players has its own amplifier(s) and a set of speakers and typically installed in one place (e.g., a room). In order to play an audio source at one location, the audio source must be provided locally or from a centralized location. When the audio source is provided locally, the multi-zone audio system functions as a collection of many stereo systems, making source sharing difficult. When the audio source is provided centrally, the centralized location may include a juke box, many compact discs, an AM or FM radio, tapes, or others. To send an audio source to an audio player demanding such source, a cross-bar type of device is used to prevent the audio source from going to other audio players that may be playing other audio sources.

In order to achieve playing different audio sources in different audio players, the traditional multi-zone audio system is generally either hard-wired or controlled by a pre-configured and pre-programmed controller. While the pre-programmed configuration may be satisfactory in one situation, it may not be suitable for another situation. For

2

example, a person would like to listen to broadcast news from his/her favorite radio station in a bedroom, a bathroom and a den while preparing to go to work in the morning. The same person may wish to listen in the den and the living room to music from a compact disc in the evening. In order to satisfy such requirements, two groups of audio players must be established. In the morning, the audio players in the bedroom, the bathroom and the den need to be grouped for the broadcast news. In the evening, the audio players in the den and the living room are grouped for the music. Over the weekend, the audio players in the den, the living room, and a kitchen are grouped for party music. Because the morning group, the evening group and the weekend group contain the den, it can be difficult for the traditional system to accommodate the requirement of dynamically managing the ad hoc creation and deletion of groups.

There is a need for dynamic control of the audio players as a group. With a minimum manipulation, the audio players may be readily grouped. In a traditional multi-zone audio system, the audio players have to be adjusted one at a time, resulting in an inconvenient and non-homogenous audio environment. Further, there is a need to individually or systematically adjust the audio volume of the audio players.

SUMMARY OF THE INVENTION

This section is for the purpose of summarizing some aspects of the present invention and to briefly introduce some preferred embodiments. Simplifications or omissions in this section as well as in the abstract or the title of this description may be made to avoid obscuring the purpose of this section, the abstract and the title. Such simplifications or omissions are not intended to limit the scope of the present invention.

In general, the present invention pertains to controlling a plurality of multimedia players, or simply players, in groups. According to one aspect of the present invention, a mechanism is provided to allow a user to group some of the players according to a theme or scene, where each of the players is located in a zone. When the scene is activated, the players in the scene react in a synchronized manner. For example, the players in the scene are all caused to play an audio source or music in a playlist, wherein the audio source may be located anywhere on a network.

According to another aspect of the present invention, the scene may be activated at any time or a specific time. A user may activate the scene at any time so that only some selected zones in an entertainment system facilitate a playback of an audio source. When the scene is activated at a specific time, the scene may be used as an alarm or buzzer.

According to still another aspect of the present invention, a controlling device (also referred to herein as controller) is provided to facilitate a user to select any of the players in the system to form respective groups each of which is set up per a scene. Although various scenes may be saved in any of the members in a group, commands are preferably sent from the controller to the rest of the members when one of the scenes is executed. Depending on implementation, the commands include parameters pertaining to identifiers of the players, volumes settings, audio source and etc.

According to yet another aspect of the present invention, a configurable module is implemented in the controlling device that provides interactive graphic user interface for forming, managing and controlling groups in the system, de-grouping a group or adjusting audio volume of individual players or a group of players.

US 10,469,966 B2

3

The present invention may be implemented in many forms including software, hardware or a combination of both. According to one embodiment, the present invention is directed to a method for groupings in a multi-zone media system, the method comprises providing a mechanism to allow a user to determine which players in the system to be associated with a theme representing a group; and configuring the theme with parameters pertaining to the players, wherein the theme is activated at anytime or a specific time so that the players react in a synchronized manner. The players in a scene are synchronized to play a multimedia file when the scene is activated.

According to another embodiment, the present invention is directed to an entertainment system for grouping players, the system comprises: a plurality of players, each located in one zone; and a controller providing a mechanism to allow a user to select which of the players to be associated with a theme representing a group; and configure the theme with parameters pertaining to the selected players, wherein the theme is activated at anytime or a specific time so that the selected players react in a synchronized manner. As a result, the selected players are synchronized to play a multimedia that is in a digital format and retrieved from a source over a network.

One of the objects, features, and advantages of the present invention is to remotely control a plurality of multimedia players in a multi-zone system, playing and controlling the audio source synchronously if the players are grouped together, or playing and controlling the audio source individually if the players are disassociated with each other.

Other objects, features, and advantages of the present invention will become apparent upon examining the following detailed description of an embodiment thereof, taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

FIG. 1 shows an exemplary configuration in which the present invention may be practiced;

FIG. 2A shows an exemplary functional block diagram of a player in accordance with the present invention;

FIG. 2B shows an example of a controller that may be used to remotely control one of more players of FIG. 2A;

FIG. 2C shows an exemplary internal functional block diagram of a controller in accordance with one embodiment of the present invention;

FIG. 3A provides an illustration of one zone scene, where the left column shows the starting zone grouping—all zones are separate, the column on the right shows the effects of grouping the zones to make a group of 3 zones named after “Morning”;

FIG. 3B shows that a user defines multiple groups to be gathered at the same time;

FIG. 4 shows an exemplary user interface that may be displayed on a controller or a computer of FIG. 1;

FIG. 5A shows a user interface to allow a user to form a scene;

FIG. 5B shows another user interface 520 to allow a user to form a scene;

FIG. 5C shows a user interface to allow a user to adjust a volume level of the zone players in a zone scene individually or collectively;

4

FIG. 6 shows a flowchart or process of providing a player theme or a zone scene for a plurality of players, where one or more of the players are placed in a zone; and

FIG. 7 shows an example user interface for invoking a zone scene; and

FIG. 8 shows another example user interface for invoking a zone scene.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The detailed description of the invention is presented largely in terms of procedures in terms of procedures, steps, logic blocks, processing, and other symbolic representations that directly or indirectly resemble the operations of data processing devices coupled to networks. These process descriptions and representations are typically used by those skilled in the art to most effectively convey the substance of their work to others skilled in the art. Numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will become obvious to those skilled in the art that the present invention may be practiced without these specific details. In other instances, well known methods, procedures, components, and circuitry have not been described in detail to avoid unnecessarily obscuring aspects of the present invention.

Reference herein to “one embodiment” or “an embodiment” means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one embodiment of the invention. The appearances of the phrase “in one embodiment” in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. Further, the order of blocks in process flowcharts or diagrams representing one or more embodiments of the invention do not inherently indicate any particular order nor imply any limitations in the invention.

Referring now to the drawings, in which like numerals refer to like parts throughout the several views. FIG. 1 shows an exemplary configuration 100 in which the present invention may be practiced. The configuration may represent, but not be limited to, a part of a residential home, a business building or a complex with multiple zones. There are a number of multimedia players of which three examples 102, 104 and 106 are shown as audio devices. Each of the audio devices may be installed or provided in one particular area or zone and hence referred to as a zone player herein.

As used herein, unless explicitly stated otherwise, an audio source or audio sources are in digital format and can be transported or streamed over a data network. To facilitate the understanding of the present invention, it is assumed that the configuration 100 represents a home. Thus, the zone player 102 and 104 may be located in two of the bedrooms respectively while the zone player 106 may be installed in a living room. All of the zone players 102, 104 and 106 are coupled directly or indirectly to a data network 108. In addition, a computing device 110 is shown to be coupled on the network 108. In reality, any other devices such as a home gateway device, a storage device, or an MP3 player may be coupled to the network 108 as well.

The network 108 may be a wired network, a wireless network or a combination of both. In one example, all devices including the zone players 102, 104 and 106 are coupled to the network 108 by wireless means based on an industry standard such as IEEE 802.11. In yet another example, all devices including the zone players 102, 104 and

US 10,469,966 B2

5

106 are part of a local area network that communicates with a wide area network (e.g., the Internet).

Many devices on the network **108** are configured to download and store audio sources. For example, the computing device **110** can download audio sources from the Internet and store the downloaded sources locally for sharing with other devices on the Internet or the network **108**. The computing device **110** or any of the zone players can also be configured to receive streaming audio. Shown as a stereo system, the device **112** is configured to receive an analog audio source (e.g., from broadcasting) or retrieve a digital audio source (e.g., from a compact disk). The analog audio sources can be converted to digital audio sources. In accordance with the present invention, the audio source may be shared among the devices on the network **108**.

Two or more zone players may be grouped together to form a new zone group. Any combinations of zone players and an existing zone group may be grouped together. In one instance, a new zone group is formed by adding one zone player to another zone player or an existing zone group.

Referring now to FIG. 2A, there is shown an exemplary functional block diagram of a zone player **200** in accordance with the present invention. The zone player **200** includes a network interface **202**, a processor **204**, a memory **206**, an audio processing circuit **210**, a module **212**, and optionally, an audio amplifier **214** that may be internal or external. The network interface **202** facilitates a data flow between a data network (i.e., the data network **108** of FIG. 1) and the zone player **200** and typically executes a special set of rules (i.e., a protocol) to send data back and forth. One of the common protocols used in the Internet is TCP/IP (Transmission Control Protocol/Internet Protocol). In general, a network interface manages the assembling of an audio source or file into smaller packets that are transmitted over the data network or reassembles received packets into the original source or file. In addition, the network interface **202** handles the address part of each packet so that it gets to the right destination or intercepts packets destined for the zone player **200**.

The network interface **202** may include one or both of a wireless interface **216** and a wired interface **217**. The wireless interface **216**, also referred to as a RF interface, provides network interface functions by a wireless means for the zone player **200** to communicate with other devices in accordance with a communication protocol (such as the wireless standard IEEE 802.11a, 802.11b or 802.11g). The wired interface **217** provides network interface functions by a wired means (e.g., an Ethernet cable). In one embodiment, a zone player includes both of the interfaces **216** and **217**, and other zone players include only a RF or wired interface. Thus these other zone players communicate with other devices on a network or retrieve audio sources via the zone player. The processor **204** is configured to control the operation of other parts in the zone player **200**. The memory **206** may be loaded with one or more software modules that can be executed by the processor **204** to achieve desired tasks. According to one aspect of the present invention, a software module implementing one embodiment of the present invention is executed, the processor **204** operates in accordance with the software module in reference to a saved zone group configuration characterizing a zone group created by a user, the zone player **200** is caused to retrieve an audio source from another zone player or a device on the network.

According to one embodiment of the present invention, the memory **206** is used to save one or more saved zone configuration files that may be retrieved for modification at

6

any time. Typically, a saved zone group configuration file is transmitted to a controller (e.g., the controlling device **140** or **142** of FIG. 1, a computer, a portable device, or a TV) when a user operates the controlling device. The zone group configuration provides an interactive user interface so that various manipulations or control of the zone players may be performed.

The audio processing circuit **210** resembles most of the circuitry in an audio playback device and includes one or more digital-to-analog converters (DAC), an audio preprocessing part, an audio enhancement part or a digital signal processor and others. In operation, when an audio source is retrieved via the network interface **202**, the audio source is processed in the audio processing circuit **210** to produce analog audio signals. The processed analog audio signals are then provided to the audio amplifier **214** for playback on speakers. In addition, the audio processing circuit **210** may include necessary circuitry to process analog signals as inputs to produce digital signals for sharing with other devices on a network.

Depending on an exact implementation, the module **212** may be implemented as a combination of hardware and software. In one embodiment, the module **212** is used to save a scene. The audio amplifier **214** is typically an analog circuit that powers the provided analog audio signals to drive one or more speakers.

Referring now to FIG. 2B, there is shown an exemplary controller **240**, which may correspond to the controlling device **140** or **142** of FIG. 1. The controller **240** may be used to facilitate the control of multi-media applications, automation and others in a complex. In particular, the controller **240** is configured to facilitate a selection of a plurality of audio sources available on the network, controlling operations of one or more zone players (e.g., the zone player **200**) through a RF interface corresponding to the RF interface **216** of FIG. 2A. According to one embodiment, the wireless means is based on an industry standard (e.g., infrared, radio, wireless standard IEEE 802.11a, 802.11b or 802.11g). When a particular audio source is being played in the zone player **200**, a picture, if there is any, associated with the audio source may be transmitted from the zone player **200** to the controller **240** for display. In one embodiment, the controller **240** is used to synchronize more than one zone players by grouping the zone players in a group. In another embodiment, the controller **240** is used to control the volume of each of the zone players in a zone group individually or together.

The user interface for the controller **240** includes a screen **242** (e.g., a LCD screen) and a set of functional buttons as follows: a “zones” button **244**, a “back” button **246**, a “music” button **248**, a scroll wheel **250**, “ok” button **252**, a set of transport control buttons **254**, a mute button **262**, a volume up/down button **264**, a set of soft buttons **266** corresponding to the labels **268** displayed on the screen **242**.

The screen **242** displays various screen menus in response to a user’s selection. In one embodiment, the “zones” button **244** activates a zone management screen or “Zone Menu”, which is described in more details below. The “back” button **246** may lead to different actions depending on the current screen. In one embodiment, the “back” button triggers the current screen display to go back to a previous one. In another embodiment, the “back” button negates the user’s erroneous selection. The “music” button **248** activates a music menu, which allows the selection of an audio source (e.g., a song) to be added to a zone player’s music queue for playback.

The scroll wheel **250** is used for selecting an item within a list, whenever a list is presented on the screen **242**. When the items in the list are too many to be accommodated in one screen display, a scroll indicator such as a scroll bar or a scroll arrow is displayed beside the list. When the scroll indicator is displayed, a user may rotate the scroll wheel **250** to either choose a displayed item or display a hidden item in the list. The “ok” button **252** is used to confirm the user selection on the screen **242**.

There are three transport buttons **254**, which are used to control the effect of the currently playing song. For example, the functions of the transport buttons may include play/pause and forward/rewind a song, move forward to a next song track, or move backward to a previous track. According to one embodiment, pressing one of the volume control buttons such as the mute button **262** or the volume up/down button **264** activates a volume panel. In addition, there are three soft buttons **266** that can be activated in accordance with the labels **268** on the screen **242**. It can be understood that, in a multi-zone system, there may be multiple audio sources being played respectively in more than one zone players. The music transport functions described herein shall apply selectively to one of the sources when a corresponding one of the zone players or zone groups is selected.

FIG. 2C illustrates an internal functional block diagram of an exemplary controller **270**, which may correspond to the controller **240** of FIG. 2B. The screen **272** on the controller **270** may be a LCD screen. The screen **272** communicates with and is commanded by a screen driver **274** that is controlled by a microcontroller (e.g., a processor) **276**. The memory **282** may be loaded with one or more application modules **284** that can be executed by the microcontroller **276** with or without a user input via the user interface **278** to achieve desired tasks. In one embodiment, an application module is configured to facilitate grouping a number of selected zone players into a zone group and synchronizing the zone players for one audio source. In another embodiment, an application module is configured to control together the audio volumes of the zone players in a zone group. In operation, when the microcontroller **276** executes one of the application modules **284**, the screen driver **274** generates control signals to drive the screen **272** to display an application specific user interface accordingly, more of which will be described below.

The controller **270** includes a network interface **280** referred to as a RF interface **280** that facilitates wireless communication with a zone player via a corresponding RF interface thereof. In one embodiment, the commands such as volume control and audio playback synchronization are sent via the RF interfaces. In another embodiment, a saved zone group configuration is transmitted between a zone player and a controller via the RF interfaces. The controller **270** may control one or more zone players, such as **102**, **104** and **106** of FIG. 1. Nevertheless, there may be more than one controllers, each preferably in a zone (e.g., a room) and configured to control any one and all of the zone players.

In one embodiment, a user creates a zone group including at least two zone players from the controller **240** that sends signals or data to one of the zone players. As all the zone players are coupled on a network, the received signals in one zone player can cause other zone players in the group to be synchronized so that all the zone players in the group playback an identical audio source or a list of identical audio sources in a timely synchronized manner. Similarly, when a user increases the audio volume of the group from the controller, the signals or data of increasing the audio volume

for the group are sent to one of the zone players and causes other zone players in the group to be increased together in volume and in scale.

According to one implementation, an application module is loaded in memory **282** for zone group management. When a predetermined key (e.g. the “zones” button **244**) is activated on the controller **240**, the application module is executed in the microcontroller **276**. The input interface **278** coupled to and controlled by the microcontroller **276** receives inputs from a user. A “Zone Menu” is then displayed on the screen **272**. The user may start grouping zone players into a zone group by activating a “Link Zones” or “Add Zone” soft button, or de-grouping a zone group by activating an “Unlink Zones” or “Drop Zone” button. The detail of the zone group manipulation will be further discussed below.

As described above, the input interface **278** includes a number of function buttons as well as a screen graphical user interface. It should be pointed out that the controller **240** in FIG. 2B is not the only controlling device that may practice the present invention. Other devices that provide the equivalent control functions (e.g., a computing device, a hand-held device) may also be configured to practice the present invention. In the above description, unless otherwise specifically described, it is clear that keys or buttons are generally referred to as either the physical buttons or soft buttons, enabling a user to enter a command or data.

One mechanism for ‘joining’ zone players together for music playback is to link a number of zone players together to form a group. To link a number of zone players together, a user may manually link each zone player or room one after the other. For example, there is a multi-zone system that includes the following zones.

- Bathroom
- Bedroom
- Den
- Dining Room
- Family Room
- Foyer

If the user wishes to link **5** of the **6** zone players using the current mechanism, he/she must start with a single zone and then manually link each zone to that zone. This mechanism may be sometimes quite time consuming. According to one embodiment, a set of zones can be dynamically linked together using one command. Using what is referred to herein as a theme or a zone scene, zones can be configured in a particular scene (e.g., morning, afternoon, or garden), where a predefined zone grouping and setting of attributes for the grouping are automatically effectuated.

For instance, a “Morning” zone scene/configuration command would link the Bedroom, Den and Dining Room together in one action. Without this single command, the user would need to manually and individually link each zone. FIG. 3A provides an illustration of one zone scene, where the left column shows the starting zone grouping—all zones are separate, the column on the right shows the effects of grouping the zones to make a group of 3 zones named after “Morning”.

Expanding this idea further, a Zone Scene can be set to create multiple sets of linked zones. For example, a scene creates **3** separate groups of zones, the downstairs zones would be linked together, the upstairs zones would be linked together in their own group, and the outside zones (in this case the patio) would move into a group of its own.

In one embodiment as shown in FIG. 3B, a user defines multiple groups to be gathered at the same time. For example: an “Evening Scene” is desired to link the following zones:

Group 1
Bedroom
Den
Dining Room
Group 2
Garage
Garden

where Bathroom, Family Room and Foyer should be separated from any group if they were part of a group before the Zone Scene was invoked.

One important of the features, benefits and objects in the present invention is that zones do not need to be separated before a zone scene is invoked. In one embodiment, a command is provided and links all zones in one step, if invoked. The command is in a form of a zone scene. After linking the appropriate zones, a zone scene command could apply the following attributes:

Set volumes levels in each zones (each zone can have a different volume)

Mute/Unmute zones.

Select and play specific music in the zones.

Set the play mode of the music (Shuffle, Repeat, Shuffle-repeat)

Set the music playback equalization of each zone (e.g., bass treble).

A further extension of this embodiment is to trigger a zone scene command as an alarm clock function. For instance the zone scene is set to apply at 8:00 am. It could link appropriate zones automatically, set specific music to play and then stop the music after a defined duration. Although a single zone may be assigned to an alarm, a scene set as an alarm clock provides a synchronized alarm, allowing any zones linked in the scene to play a predefined audio (e.g., a favorable song, a predefined playlist) at a specific time or for a specific duration. If, for any reason, the scheduled music failed to be played (e.g., an empty playlist, no connection to a share, failed UPnP, no Internet connection for an Internet Radio station), a backup buzzer will sound. This buzzer will be a sound file that is stored in a zone player.

FIG. 4 shows an exemplary user interface 400 that may be displayed on a controller 142 or a computer 110 of FIG. 1. The interface 400 shows a list of items that may be set up by a user to cause a scene to function at a specific time. In the embodiment shown in FIG. 4, the list of items includes “Alarm”, “Time”, “Zone”, “Music”, “Frequency” and “Alarm length”. “Alarm” can be set on or off. When “Alarm” is set on, “Time” is a specific time to set off the alarm. “Zone” shows which zone players are being set to play a specified audio at the specific time. “Music” shows what to be played when the specific time arrives. “Frequency” allows the user to define a frequency of the alarm. “Alarm length” defines how long the audio is to be played. It should be noted that the user interface 400 is provided herein to show some of the functions associated with setting up an alarm. Depending on an exact implementation, other functions, such as time zone, daylight savings, time synchronization, and time/date format for display may also be provided without departing from the present invention.

According to one embodiment, each zone player in a scene may be set up for different alarms. For example, a “Morning” scene includes three zone players, each in a bedroom, a den, and a dining room. After selecting the

scene, the user may set up an alarm for the scene as whole. As a result, each of the zone players will be activated at a specific time.

FIG. 5A shows a user interface 500 to allow a user to form a scene. The panel on the left shows the available zones in a household. The panel on the right shows the zones that have been selected and be grouped as part of this scene. Depending on an exact implementation of a user interface, Add/Remove buttons may be provided to move zones between the panels, or zones may be dragged along between panels.

FIG. 5B shows another user interface 520 to allow a user to form a scene. The user interface 520 that may be displayed on a controller or a computing device, lists available zones in a system. The list of zones in the user interface 520 includes ALL the zones in the system, including the zones that are already grouped. A checkbox is provide next to each of the zones so that a user may check in the zones to be associated with the scene.

FIG. 5C shows a user interface 510 to allow a user to adjust a volume level of the zone players in a zone scene individually or collectively. As shown in the user interface 510, the “Volumes . . .” button (shown as sliders, other forms are possible) allows the user to affect the volumes of the associated zone players when a zone scene is invoked. In one embodiment, the zone players can be set to retain whatever volume that they currently have when the scene is invoked. Additionally the user can decide if the volumes should be unmuted or muted when the scene is invoked.

FIG. 6 shows a flowchart or process 600 of providing a player theme or a zone scene for a plurality of players, where one or more of the players are placed in a zone. The process 600 is presented in accordance with one embodiment of the present invention and may be implemented in a module to be located in the memory 282 of FIG. 2C.

The process 600 is initiated only when a user decides to proceed with a zone scene at 602. The process 600 then moves to 604 where it allows a user to decide which zone players to be associated with the scene. For example, there are ten players in a household, and the scene is named after “Morning”. The user may be given an interface to select four of the ten players to be associated with the scene. At 606, the scene is saved. The scene may be saved in any one of the members in the scene. In the example of FIG. 1, the scene is saved in one of the zone players and displayed on the controller 142. In operation, a set of data pertaining to the scene includes a plurality of parameters. In one embodiment, the parameters include, but may not be limited to, identifiers (e.g., IP address) of the associated players and a playlist. The parameters may also include volume/tone settings for the associated players in the scene. The user may go back to 602 to configure another scene if desired.

Given a saved scene, a user may activate the scene at any time or set up a timer to activate the scene at 610. The process 600 can continue when a saved scene is activated at 610. At 612, upon the activation of a saved scene, the process 600 checks the status of the players associated with the scene. The status of the players means that each of the players shall be in condition to react in a synchronized manner. In one embodiment, the interconnections of the players are checked to make sure that the players communicate among themselves and/or with a controller if there is such a controller in the scene.

It is assumed that all players associated with the scene are in good condition. At 614, commands are executed with the parameters (e.g., pertaining to a playlist and volumes). In one embodiment, data including the parameters is trans-

US 10,469,966 B2

11

ported from a member (e.g., a controller) to other members in the scene so that the players are caused to synchronize an operation configured in the scene. The operation may cause all players to play back a song in identical or different volumes or to play back a pre-stored file.

One of the features, benefits and advantages in the present invention is to allow sets of related devices (controllers and operating components) to exist as a group without interfering with other components that are potentially visible on the same wired or wireless network. Each of the sets is configured to a theme or a scene.

FIG. 7 shows an example user interface for invoking a zone scene. The user interface of FIG. 7 shows a Zone Menu that includes selectable indications of zone scenes.

FIG. 8 shows another example user interface for invoking a zone scene. FIG. 8 shows a Zone Menu that includes a softkey indicating a Scenes menu. Pressing the Scenes softkey will show the Scenes menu where all the available zone scenes are shown as selectable indications.

The present invention has been described in sufficient detail with a certain degree of particularity. It is understood to those skilled in the art that the present disclosure of embodiments has been made by way of examples only and that numerous changes in the arrangement and combination of parts may be resorted without departing from the spirit and scope of the invention as claimed. While the embodiments discussed herein may appear to include some limitations as to the presentation of the information units, in terms of the format and arrangement, the invention has applicability well beyond such embodiment, which can be appreciated by those skilled in the art. Accordingly, the scope of the present invention is defined by the appended claims rather than the foregoing description of embodiments.

I claim:

1. A computing device comprising: one or more processors;

a non-transitory computer-readable medium; and program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

while serving as a controller for a networked media playback system comprising a first zone player and at least two other zone players, wherein the first zone player is operating in a standalone mode in which the first zone player is configured to play back media individually:

receiving a first request to create a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked;

based on the first request, i) causing creation of the first zone scene, ii) causing an indication of the first zone scene to be transmitted to the first zone player, and iii) causing storage of the first zone scene;

receiving a second request to create a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the third zone player is different than the second zone player;

based on the second request, i) causing creation of the second zone scene, ii) causing an indication of the second zone scene to be transmitted to the first zone player, and iii) causing storage of the second zone

12

scene; displaying a representation of the first zone scene and a representation of the second zone scene; and while displaying the representation of the first zone scene and the representation of the second zone scene, receiving a third request to invoke the first zone scene; and

based on the third request, causing the first zone player to transition from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

2. The computing device of claim 1, further comprising program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

while the first zone player is configured to coordinate with at least the second zone player to play back media in synchrony with at least the second zone player, receiving a fourth request to invoke the second zone scene; and

based on the fourth request, causing the first zone player to (a) cease to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) begin to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

3. The computing device of claim 1, wherein causing storage of the first zone scene comprises causing storage of the first zone scene at a location other than the computing device, and wherein causing storage of the second zone scene comprises causing storage of the second zone scene at the location other than the computing device.

4. The computing device of claim 3, wherein the location other than the computing device comprises a zone player of the first predefined grouping of zone players.

5. The computing device of claim 1, wherein the first zone scene further comprises an indication of predetermined media to be played when the first zone scene is invoked, and wherein the computing device further comprises program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

based on the third request, causing the first zone player to coordinate with at least the second zone player to output the predetermined media in synchrony with output of the predetermined media by at least the second zone player.

6. The computing device of claim 1, wherein the first predefined grouping of zone players does not include the third zone player, and wherein the second predefined grouping of zone players does not include the second zone player.

7. The computing device of claim 1, further comprising program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

US 10,469,966 B2

13

before displaying the representation of the first zone scene and the representation of the second zone scene, receiving, from another device over a data network, data defining the first zone scene and data defining the second zone scene.

8. The computing device of claim 1, wherein receiving the first request comprises receiving a first set of one or more inputs via a user interface of the computing device, wherein receiving the second request comprises receiving a second set of one or more inputs via the user interface, and wherein receiving the third request comprises receiving a third set of one or more inputs via the user interface.

9. A non-transitory computer-readable medium, wherein the non-transitory computer-readable medium is provisioned with program instructions that are executable to cause a computing device to perform functions comprising:

while serving as a controller for a networked media playback system comprising a first zone player and at least two other zone players, wherein the first zone player is operating in a standalone mode in which the first zone player is configured to play back media individually:

receiving a first request to create a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked; based on the first request, i) causing creation of the first zone scene, ii) causing an indication of the first zone scene to be transmitted to the first zone player, and iii) causing storage of the first zone scene;

receiving a second request to create a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the third zone player is different than the second zone player;

based on the second request, i) causing creation of the second zone scene, ii) causing an indication of the second zone scene to be transmitted to the first zone player, and iii) causing storage of the second zone scene;

displaying a representation of the first zone scene and a representation of the second zone scene; and

while displaying the representation of the first zone scene and the representation of the second zone scene, receiving a third request to invoke the first zone scene; and based on the third request, causing the first zone player to transition from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

10. The non-transitory computer-readable medium of claim 9, wherein the non-transitory computer-readable medium is also provisioned with program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

while the first zone player is configured to coordinate with at least the second zone player to play back media in synchrony with at least the second zone player, receiving a fourth request to invoke the second zone scene; and

14

based on the fourth request, causing the first zone player to (a) cease to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) begin to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

11. The non-transitory computer-readable medium of claim 9, wherein causing storage of the first zone scene comprises causing storage of the first zone scene at a location other than the computing device, and wherein causing storage of the second zone scene comprises causing storage of the second zone scene at the location other than the computing device.

12. The non-transitory computer-readable medium of claim 11, wherein the location other than the computing device comprises a zone player of the first predefined grouping of zone players.

13. The non-transitory computer-readable medium of claim 9, wherein the first zone scene further comprises an indication of predetermined media to be played when the first zone scene is invoked, and wherein the non-transitory computer-readable medium is also provisioned with program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

based on the third request, causing the first zone player to coordinate with at least the second zone player to output the predetermined media in synchrony with output of the predetermined media by at least the second zone player.

14. The non-transitory computer-readable medium of claim 9, wherein the first predefined grouping of zone players does not include the third zone player, and wherein the second predefined grouping of zone players does not include the second zone player.

15. The non-transitory computer-readable medium of claim 9, wherein the non-transitory computer-readable medium further comprises program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

before displaying the representation of the first zone scene and the representation of the second zone scene, receiving, from another device over a data network, data defining the first zone scene and data defining the second zone scene.

16. The non-transitory computer-readable medium of claim 9, wherein receiving the first request comprises receiving a first set of one or more inputs via a user interface of the computing device, wherein receiving the second request comprises receiving a second set of one or more inputs via the user interface, and wherein receiving the third request comprises receiving a third set of one or more inputs via the user interface.

17. A method executed by a computing device, the method comprising:

while serving as a controller for a networked media playback system comprising a first zone player and at least two other zone players, wherein the first zone

US 10,469,966 B2

15

player is operating in a standalone mode in which the first zone player is configured to play back media individually;

receiving a first request to create a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked; based on the first request, i) causing creation of the first zone scene, ii) causing an indication of the first zone scene to be transmitted to the first zone player, and iii) causing storage of the first zone scene;

receiving a second request to create a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the third zone player is different than the second zone player;

based on the second request, i) causing creation of the second zone scene, ii) causing an indication of the second zone scene to be transmitted to the first zone player, and iii) causing storage of the second zone scene;

displaying a representation of the first zone scene and a representation of the second zone scene; and while displaying the representation of the first zone scene and the representation of the second zone scene, receiving a third request to invoke the first zone scene; and based on the third request, causing the first zone player to transition from operating in the standalone mode to operating in accordance with the first predefined group-

16

ing of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

18. The method of claim **17**, further comprising: while the first zone player is configured to coordinate with at least the second zone player to play back media in synchrony with at least the second zone player, receiving a fourth request to invoke the second zone scene; and

based on the fourth request, causing the first zone player to (a) cease to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) begin to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

19. The method of claim **17**, wherein causing storage of the first zone scene comprises causing storage of the first zone scene at a location other than the computing device, wherein causing storage of the second zone scene comprises causing storage of the second zone scene at the location other than the computing device.

20. The method of claim **19**, wherein the location other than the computing device comprises a zone player of the first predefined grouping of zone players.

* * * * *



US01084885B2

(12) **United States Patent**
Lambourne

(10) **Patent No.:** **US 10,848,885 B2**

(45) **Date of Patent:** ***Nov. 24, 2020**

(54) **ZONE SCENE MANAGEMENT**

(56) **References Cited**

(71) Applicant: **SONOS, INC.**, Santa Barbara, CA (US)

U.S. PATENT DOCUMENTS

(72) Inventor: **Robert A. Lambourne**, Santa Barbara, CA (US)

3,956,591 A 5/1976 Gates, Jr.
4,105,974 A 8/1978 Rogers
(Continued)

(73) Assignee: **Sonos, Inc.**, Santa Barbara, CA (US)

FOREIGN PATENT DOCUMENTS

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

CA 2320451 A1 3/2001
CN 1598767 A 3/2005
(Continued)

This patent is subject to a terminal disclaimer.

OTHER PUBLICATIONS

(21) Appl. No.: **16/383,561**

Yamaha DME Designer 3.5 user manual (Year: 2004).*

(22) Filed: **Apr. 12, 2019**

(Continued)

(65) **Prior Publication Data**

Primary Examiner — Paul C McCord

US 2019/0239008 A1 Aug. 1, 2019

Related U.S. Application Data

(57)

ABSTRACT

(63) Continuation of application No. 15/130,919, filed on Apr. 15, 2016, which is a continuation of application (Continued)

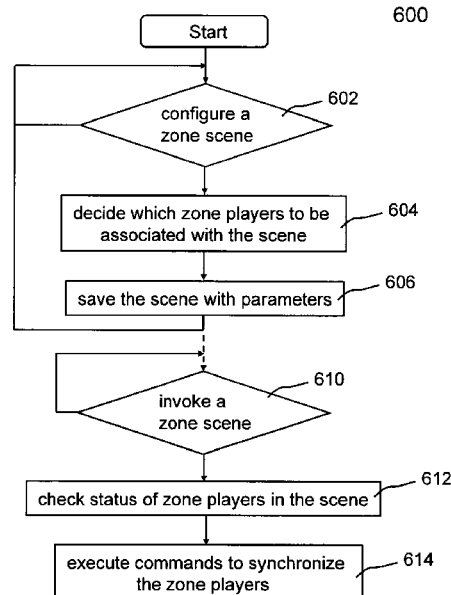
An example playback device in a first zone of a media playback system receives a first indication that the first zone has been added to a first zone scene including a first preconfigured grouping of zones including the first zone and a second zone. The playback device receives a second indication that the first zone has been added to a second zone scene including a second preconfigured grouping of zones including the first zone and a third zone. After a given one of the first and second zone scenes has been selected for invocation, the playback device receives an instruction to operate in accordance with the given zone scene, and based on the instruction, begins operating in accordance with the given zone scene such that the playback device is configured to play back audio in synchrony with one or more other playback devices in the media playback system.

(51) **Int. Cl.**
G06F 17/00 (2019.01)
H04R 27/00 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC **H04R 27/00** (2013.01); **G05B 15/02** (2013.01); **G06F 3/0482** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04R 27/00; H04R 3/12; H04R 2227/005;
H04R 2430/01; G05B 15/02;
(Continued)

20 Claims, 11 Drawing Sheets



US 10,848,885 B2

Page 2

Related U.S. Application Data

- No. 14/465,457, filed on Aug. 21, 2014, now Pat. No. 9,344,206, which is a continuation of application No. 13/896,829, filed on May 17, 2013, now Pat. No. 8,843,228, which is a continuation of application No. 11/853,790, filed on Sep. 11, 2007, now Pat. No. 8,483,853.
- (60) Provisional application No. 60/825,407, filed on Sep. 12, 2006.
- (51) **Int. Cl.**
G05B 15/02 (2006.01)
H04N 21/436 (2011.01)
H04R 3/12 (2006.01)
G06F 3/16 (2006.01)
H03G 7/00 (2006.01)
G06F 3/0482 (2013.01)
G06F 3/0484 (2013.01)
H03G 1/02 (2006.01)
H04H 60/80 (2008.01)
- (52) **U.S. Cl.**
CPC **G06F 3/04842** (2013.01); **G06F 3/16** (2013.01); **G06F 3/165** (2013.01); **H03G 1/02** (2013.01); **H03G 7/00** (2013.01); **H04H 60/80** (2013.01); **H04N 21/43615** (2013.01); **H04R 3/12** (2013.01); **H04R 2227/005** (2013.01); **H04R 2430/01** (2013.01)
- (58) **Field of Classification Search**
CPC G06F 3/0482; G06F 3/04842; G06F 3/16; G06F 3/165; H03G 1/02; H03G 7/00; H04H 60/80; H04N 21/43615
USPC 700/94
See application file for complete search history.
- (56) **References Cited**
U.S. PATENT DOCUMENTS
- | | | | | | | | |
|-----------|---|---------|-------------------|-----------|---|---------|--------------------|
| D260,764 | S | 9/1981 | Castagna et al. | 5,182,552 | A | 1/1993 | Paynting |
| 4,296,278 | A | 10/1981 | Cullison et al. | D333,135 | S | 2/1993 | Wachob et al. |
| 4,306,114 | A | 12/1981 | Callahan | 5,185,680 | A | 2/1993 | Kakubo |
| 4,382,158 | A | 5/1983 | Ohshita et al. | 5,197,099 | A | 3/1993 | Hirasawa |
| 4,509,211 | A | 4/1985 | Robbins | 5,237,327 | A | 8/1993 | Saitoh et al. |
| D279,779 | S | 7/1985 | Taylor | 5,239,458 | A | 8/1993 | Suzuki |
| 4,530,091 | A | 7/1985 | Crockett | 5,272,757 | A | 12/1993 | Scotfield et al. |
| 4,661,902 | A | 4/1987 | Hochsprung et al. | 5,299,266 | A | 3/1994 | Lumsden |
| 4,689,786 | A | 8/1987 | Sidhu et al. | 5,313,524 | A | 5/1994 | Van Hulle et al. |
| 4,696,037 | A | 9/1987 | Fierens | D350,531 | S | 9/1994 | Tsuji |
| 4,701,629 | A | 10/1987 | Citroen | D350,962 | S | 9/1994 | Reardon et al. |
| 4,712,105 | A | 12/1987 | Koehler | 5,361,381 | A | 11/1994 | Short |
| D293,671 | S | 1/1988 | Beaumont | 5,372,441 | A | 12/1994 | Louis |
| 4,731,814 | A | 3/1988 | Becker et al. | D354,059 | S | 1/1995 | Hendricks |
| 4,816,989 | A | 3/1989 | Finn et al. | D354,751 | S | 1/1995 | Hersh et al. |
| 4,824,059 | A | 4/1989 | Butler | D356,093 | S | 3/1995 | McCauley et al. |
| D301,037 | S | 5/1989 | Matsuda | D356,312 | S | 3/1995 | Althans |
| 4,845,751 | A | 7/1989 | Schwab | D357,024 | S | 4/1995 | Tokiyama et al. |
| D304,443 | S | 11/1989 | Grinyer et al. | 5,406,634 | A | 4/1995 | Anderson et al. |
| D313,023 | S | 12/1990 | Kolenda et al. | 5,430,485 | A | 7/1995 | Lankford et al. |
| D313,398 | S | 1/1991 | Gilchrist | 5,440,644 | A | 8/1995 | Farinelli et al. |
| D313,600 | S | 1/1991 | Weber | D362,446 | S | 9/1995 | Gasiorek et al. |
| 4,994,908 | A | 2/1991 | Kuban et al. | 5,457,448 | A | 10/1995 | Totsuka et al. |
| 4,995,778 | A | 2/1991 | Bruessel | D363,933 | S | 11/1995 | Starck |
| D320,598 | S | 10/1991 | Auerbach et al. | 5,467,342 | A | 11/1995 | Logston et al. |
| D322,609 | S | 12/1991 | Patton | D364,877 | S | 12/1995 | Tokiyama et al. |
| 5,086,385 | A | 2/1992 | Launey et al. | D364,878 | S | 12/1995 | Green et al. |
| D326,450 | S | 5/1992 | Watanabe | D365,102 | S | 12/1995 | Gioscia |
| D327,060 | S | 6/1992 | Wachob et al. | D366,044 | S | 1/1996 | Hara et al. |
| 5,151,922 | A | 9/1992 | Weiss | 5,481,251 | A | 1/1996 | Buys et al. |
| 5,153,579 | A | 10/1992 | Fisch et al. | 5,491,839 | A | 2/1996 | Schotz |
| D331,388 | S | 12/1992 | Dahnert et al. | 5,515,345 | A | 5/1996 | Barreira et al. |
| | | | | 5,519,641 | A | 5/1996 | Beers et al. |
| | | | | 5,533,021 | A | 7/1996 | Branstad et al. |
| | | | | D372,716 | S | 8/1996 | Thorne |
| | | | | 5,553,147 | A | 9/1996 | Pineau |
| | | | | 5,553,222 | A | 9/1996 | Milne et al. |
| | | | | 5,553,314 | A | 9/1996 | Grube et al. |
| | | | | D377,651 | S | 1/1997 | Biasotti et al. |
| | | | | 5,596,696 | A | 1/1997 | Tindell et al. |
| | | | | 5,602,992 | A | 2/1997 | Danneels |
| | | | | 5,623,483 | A | 4/1997 | Agrawal et al. |
| | | | | 5,625,350 | A | 4/1997 | Fukatsu et al. |
| | | | | D379,816 | S | 6/1997 | Laituri et al. |
| | | | | 5,640,388 | A | 6/1997 | Woodhead et al. |
| | | | | 5,642,171 | A | 6/1997 | Baumgartner et al. |
| | | | | D380,752 | S | 7/1997 | Hanson |
| | | | | 5,652,749 | A | 7/1997 | Davenport et al. |
| | | | | D382,271 | S | 8/1997 | Akwivu |
| | | | | 5,661,665 | A | 8/1997 | Glass et al. |
| | | | | 5,668,884 | A | 9/1997 | Clair, Jr. et al. |
| | | | | 5,673,323 | A | 9/1997 | Schotz et al. |
| | | | | D384,940 | S | 10/1997 | Kono et al. |
| | | | | D387,352 | S | 12/1997 | Kaneko et al. |
| | | | | 5,696,896 | A | 12/1997 | Badovinatz et al. |
| | | | | D388,792 | S | 1/1998 | Nykerk |
| | | | | D389,143 | S | 1/1998 | Wicks |
| | | | | D392,641 | S | 3/1998 | Fenner |
| | | | | 5,726,989 | A | 3/1998 | Dokic |
| | | | | D393,628 | S | 4/1998 | Ledbetter et al. |
| | | | | 5,740,235 | A | 4/1998 | Lester et al. |
| | | | | 5,742,623 | A | 4/1998 | Nuber et al. |
| | | | | D394,659 | S | 5/1998 | Biasotti et al. |
| | | | | 5,751,819 | A | 5/1998 | Dorrough |
| | | | | 5,761,320 | A | 6/1998 | Farinelli et al. |
| | | | | 5,774,016 | A | 6/1998 | Ketterer |
| | | | | D395,889 | S | 7/1998 | Gerba et al. |
| | | | | 5,787,249 | A | 7/1998 | Badovinatz et al. |
| | | | | 5,790,543 | A | 8/1998 | Cloutier |
| | | | | D397,996 | S | 9/1998 | Smith |
| | | | | 5,808,662 | A | 9/1998 | Kinney et al. |
| | | | | 5,812,201 | A | 9/1998 | Yoo |
| | | | | 5,815,689 | A | 9/1998 | Shaw et al. |
| | | | | 5,818,948 | A | 10/1998 | Gulick |
| | | | | D401,587 | S | 11/1998 | Rudolph |
| | | | | 5,832,024 | A | 11/1998 | Schotz et al. |
| | | | | 5,848,152 | A | 12/1998 | Slipy et al. |
| | | | | 5,852,722 | A | 12/1998 | Hamilton |
| | | | | 5,852,744 | A | 12/1998 | Agatone et al. |

US 10,848,885 B2

Page 3

(56)

References Cited

U.S. PATENT DOCUMENTS

D404,741 S	1/1999	Schumaker et al.	6,313,879 B1	11/2001	Kubo et al.
D405,071 S	2/1999	Gambara	6,321,252 B1	11/2001	Bhola et al.
5,867,691 A	2/1999	Shiraishi	6,324,586 B1	11/2001	Johnson
5,875,233 A	2/1999	Cox	D452,520 S	12/2001	Gotham et al.
5,875,354 A	2/1999	Charlton et al.	6,332,147 B1	12/2001	Moran et al.
D406,847 S	3/1999	Gerba et al.	6,336,219 B1	1/2002	Nathan
D407,071 S	3/1999	Keating	6,343,028 B1	1/2002	Kuwaoka
5,887,143 A	3/1999	Saito et al.	6,349,285 B1	2/2002	Liu et al.
5,905,768 A	5/1999	Maturi et al.	6,349,339 B1	2/2002	Williams
D410,927 S	6/1999	Yamagishi	6,349,352 B1	2/2002	Lea
5,910,990 A	6/1999	Jang	6,351,821 B1	2/2002	Voth
5,910,991 A	6/1999	Farrar	6,353,172 B1	3/2002	Fay et al.
D412,337 S	7/1999	Hamano	6,356,871 B1	3/2002	Hemkumar et al.
5,923,869 A	7/1999	Kashiwagi et al.	6,404,811 B1	6/2002	Cvetko et al.
5,923,902 A	7/1999	Inagaki	6,418,150 B1	7/2002	Staats
5,946,343 A	8/1999	Schotz et al.	6,430,353 B1	8/2002	Honda et al.
5,956,025 A	9/1999	Goulden et al.	6,442,443 B1	8/2002	Fujii et al.
5,956,088 A	9/1999	Shen et al.	D462,339 S	9/2002	Allen et al.
5,960,006 A	9/1999	Maturi et al.	D462,340 S	9/2002	Allen et al.
5,960,167 A	9/1999	Roberts et al.	D462,945 S	9/2002	Skulley
D415,496 S	10/1999	Gerba et al.	6,449,642 B2	9/2002	Bourke-Dunphy et al.
D416,021 S	11/1999	Godette et al.	6,449,653 B2	9/2002	Klemets et al.
5,984,512 A	11/1999	Jones et al.	6,456,783 B1	9/2002	Ando et al.
5,987,611 A	11/1999	Freund	6,463,474 B1	10/2002	Fuh et al.
5,990,884 A	11/1999	Douma et al.	6,466,832 B1	10/2002	Zuqert et al.
5,991,307 A	11/1999	Komuro et al.	6,469,633 B1	10/2002	Wachter et al.
5,999,906 A	12/1999	Mercs et al.	D466,108 S	11/2002	Glodava et al.
6,009,457 A	12/1999	Moller	6,487,296 B1	11/2002	Allen et al.
6,018,376 A	1/2000	Nakatani	6,493,832 B1	12/2002	Itakura et al.
D420,006 S	2/2000	Tonino	D468,297 S	1/2003	Ikeda
6,026,150 A	2/2000	Frank et al.	6,522,886 B1	2/2003	Youngs et al.
6,026,297 A	2/2000	Haartsen	6,526,325 B1	2/2003	Sussman et al.
6,029,196 A	2/2000	Lenz	6,535,121 B2	3/2003	Mathney et al.
6,031,818 A	2/2000	Lo et al.	D474,763 S	5/2003	Tozaki et al.
6,032,202 A	2/2000	Lea et al.	D475,993 S	6/2003	Meyer et al.
6,038,614 A	3/2000	Chan et al.	D476,643 S	7/2003	Yamagishi
6,046,550 A	4/2000	Ference et al.	D477,310 S	7/2003	Moransais
6,061,457 A	5/2000	Stockhamer	6,587,127 B1	7/2003	Leeke et al.
6,078,725 A	6/2000	Tanaka	6,598,172 B1	7/2003	Vandeusen et al.
6,081,266 A	6/2000	Sciammarella	D478,051 S	8/2003	Sagawa
6,085,236 A	7/2000	Lea	D478,069 S	8/2003	Beck et al.
6,088,063 A	7/2000	Shiba	D478,896 S	8/2003	Summers
D429,246 S	8/2000	Holma	6,604,023 B1	8/2003	Brown et al.
D430,143 S	8/2000	Renk	6,611,537 B1	8/2003	Edens et al.
6,101,195 A	8/2000	Lyons et al.	D479,520 S	9/2003	De
6,108,485 A	8/2000	Kim	D481,056 S	10/2003	Kawasaki et al.
6,108,686 A	8/2000	Williams, Jr.	6,631,410 B1	10/2003	Kowalski et al.
6,119,239 A	9/2000	Fujii	6,636,269 B1	10/2003	Baldwin
6,122,668 A	9/2000	Teng et al.	6,653,899 B2	11/2003	Organvidez et al.
6,122,749 A	9/2000	Gulick	6,654,720 B1	11/2003	Graham et al.
D431,552 S	10/2000	Backs et al.	6,654,956 B1	11/2003	Trinh et al.
D432,525 S	10/2000	Beecroft	6,658,091 B1	12/2003	Naidoo et al.
6,127,941 A	10/2000	Van Ryzin	6,674,803 B1	1/2004	Kesselring
6,128,318 A	10/2000	Sato	6,684,060 B1	1/2004	Curtin
6,131,130 A	10/2000	Van Ryzin	D486,145 S	2/2004	Kaminski et al.
6,148,205 A	11/2000	Cotton	6,687,664 B1	2/2004	Sussman et al.
6,157,957 A	12/2000	Berthaud	6,703,940 B1	3/2004	Allen et al.
6,163,647 A	12/2000	Terashima et al.	6,704,421 B1	3/2004	Kitamura
6,169,725 B1	1/2001	Gibbs et al.	6,732,176 B1	5/2004	Stewart et al.
6,175,872 B1	1/2001	Neumann et al.	6,741,708 B1	5/2004	Nakatsugawa
6,181,383 B1	1/2001	Fox et al.	6,741,961 B2	5/2004	Lim
6,185,737 B1	2/2001	Northcutt et al.	D491,925 S	6/2004	Griesau et al.
6,195,435 B1	2/2001	Kitamura	6,757,517 B2	6/2004	Chang et al.
6,195,436 B1	2/2001	Scibora et al.	D493,148 S	7/2004	Shibata et al.
6,199,169 B1	3/2001	Voth	6,763,274 B1	7/2004	Gilbert
6,212,282 B1	4/2001	Mershon	D495,333 S	8/2004	Borsboom
6,246,701 B1	6/2001	Slattery	6,772,267 B2	8/2004	Thaler et al.
6,253,293 B1	6/2001	Rao et al.	6,778,073 B2	8/2004	Lutter et al.
D444,475 S	7/2001	Levey et al.	6,778,493 B1	8/2004	Ishii
6,255,961 B1	7/2001	Van et al.	6,778,869 B2	8/2004	Champion
6,256,554 B1	7/2001	DiLorenzo	D496,003 S	9/2004	Spira
6,269,406 B1	7/2001	Dutcher et al.	D496,005 S	9/2004	Wang
6,301,012 B1	10/2001	White et al.	D496,335 S	9/2004	Spira
6,308,207 B1	10/2001	Tseng et al.	6,788,938 B1	9/2004	Sugaya et al.
6,310,652 B1	10/2001	Li et al.	D497,363 S	10/2004	Olson et al.
			6,803,964 B1	10/2004	Post et al.
			6,809,635 B1	10/2004	Kaaresoja
			D499,086 S	11/2004	Polito
			6,816,510 B1	11/2004	Banerjee

US 10,848,885 B2

Page 4

(56)

References Cited

U.S. PATENT DOCUMENTS

6,816,818 B2	11/2004	Wolf et al.	7,161,939 B2	1/2007	Israel et al.
6,823,225 B1	11/2004	Sass	7,162,315 B2	1/2007	Gilbert
6,826,283 B1	11/2004	Wheeler et al.	7,171,010 B2	1/2007	Martin et al.
D499,395 S	12/2004	Hsu	7,174,157 B2	2/2007	Gassho et al.
D499,718 S	12/2004	Chen	7,184,774 B2	2/2007	Robinson et al.
D500,015 S	12/2004	Gubbe	7,185,090 B2	2/2007	Kowalski et al.
6,836,788 B2	12/2004	Kim et al.	7,187,947 B1	3/2007	White et al.
6,839,752 B1	1/2005	Miller et al.	7,197,148 B2	3/2007	Nourse et al.
D501,477 S	2/2005	Hall	7,206,367 B1	4/2007	Moore et al.
6,859,460 B1	2/2005	Chen	7,206,618 B2	4/2007	Latto et al.
6,859,538 B1	2/2005	Voltz	7,206,967 B1	4/2007	Marti et al.
6,870,934 B2	3/2005	Krochmal et al.	7,209,795 B2	4/2007	Sullivan et al.
6,873,862 B2	3/2005	Reshefsky	7,215,649 B2	5/2007	Yu et al.
6,882,335 B2	4/2005	Saarinén	7,218,708 B2	5/2007	Berezowski et al.
D504,872 S	5/2005	Uehara et al.	7,236,739 B2	6/2007	Chang et al.
D504,885 S	5/2005	Zhang et al.	7,236,773 B2	6/2007	Thomas
6,889,207 B2	5/2005	Slemmer et al.	7,246,374 B1	7/2007	Simon et al.
6,898,642 B2	5/2005	Chaffe et al.	7,257,398 B1	8/2007	Ukita et al.
6,901,439 B1	5/2005	Bonasia et al.	7,260,616 B1	8/2007	Cook
D506,463 S	6/2005	Daniels	7,263,110 B2	8/2007	Fujishiro
6,907,458 B2	6/2005	Tomasseti et al.	7,269,338 B2	9/2007	Janevski
6,912,610 B2	6/2005	Spencer	7,274,761 B2	9/2007	Muller et al.
6,915,347 B2	7/2005	Hanko et al.	7,275,156 B2	9/2007	Balfanz et al.
6,916,980 B2	7/2005	Ishida et al.	7,277,547 B1	10/2007	Delker et al.
6,917,592 B1	7/2005	Ramankutty et al.	7,286,652 B1	10/2007	Azriel et al.
6,919,771 B2	7/2005	Nakajima	7,289,631 B2	10/2007	Ishidoshiro
6,920,373 B2	7/2005	Xi et al.	7,293,060 B2	11/2007	Komsi
6,931,134 B1	8/2005	Waller, Jr. et al.	7,295,548 B2	11/2007	Blank et al.
6,931,557 B2	8/2005	Togawa	7,302,468 B2	11/2007	Wijeratne
6,934,766 B1	8/2005	Russell	7,305,694 B2	12/2007	Commons et al.
6,937,988 B1	8/2005	Hemkumar et al.	7,308,188 B2	12/2007	Namatame
6,950,666 B2	9/2005	Asakawa	7,308,489 B2	12/2007	Weast
6,965,948 B1	11/2005	Eneborg et al.	7,310,334 B1	12/2007	Fitzgerald et al.
6,970,481 B2	11/2005	Gray, III et al.	7,312,785 B2	12/2007	Tsuk et al.
6,970,482 B2	11/2005	Kim	7,313,384 B1	12/2007	Meenan et al.
6,981,259 B2	12/2005	Luman et al.	7,313,593 B1	12/2007	Pulito et al.
6,985,694 B1	1/2006	De Bonet et al.	7,319,764 B1	1/2008	Reid et al.
6,987,767 B2	1/2006	Saito	7,324,857 B2	1/2008	Goddard
6,987,947 B2	1/2006	Richenstein et al.	7,330,875 B1	2/2008	Parasnis et al.
6,993,570 B1	1/2006	Irani	7,333,519 B2	2/2008	Sullivan et al.
D515,072 S	2/2006	Lee	7,346,332 B2	3/2008	McCarty et al.
D515,557 S	2/2006	Okuley	7,356,011 B1	4/2008	Waters et al.
7,007,106 B1	2/2006	Flood et al.	7,359,006 B1	4/2008	Xiang et al.
7,020,791 B1	3/2006	Aweya et al.	7,363,363 B2	4/2008	Dal Canto et al.
D518,475 S	4/2006	Yang et al.	7,366,206 B2	4/2008	Lockridge et al.
7,043,477 B2	5/2006	Mercer et al.	7,372,846 B2	5/2008	Zwack
7,043,651 B2	5/2006	Aweya et al.	7,376,834 B2	5/2008	Edwards et al.
7,046,677 B2	5/2006	Monta et al.	7,391,791 B2	6/2008	Balassanian et al.
7,047,308 B2	5/2006	Deshpande	7,392,102 B2	6/2008	Sullivan et al.
7,054,888 B2	5/2006	LaChapelle et al.	7,392,387 B2	6/2008	Balfanz et al.
7,058,889 B2	6/2006	Trovato et al.	7,392,481 B2	6/2008	Gewickey et al.
7,068,596 B1	6/2006	Mou	7,400,644 B2	7/2008	Sakamoto et al.
D524,296 S	7/2006	Kita	7,400,732 B2	7/2008	Staddon et al.
7,072,477 B1	7/2006	Kincaid	7,412,499 B2	8/2008	Chang et al.
7,076,204 B2	7/2006	Richenstein et al.	7,424,267 B2	9/2008	Eisenbach
D527,375 S	8/2006	Flora et al.	7,428,310 B2	9/2008	Park
7,092,528 B2	8/2006	Patrick et al.	7,430,181 B1	9/2008	Hong
7,092,694 B2	8/2006	Griep et al.	7,454,619 B2	11/2008	Smetters et al.
7,096,169 B2	8/2006	Crutchfield et al.	7,457,948 B1	11/2008	Bilicksa et al.
7,107,442 B2	9/2006	Cheshire	7,472,058 B2	12/2008	Tseng et al.
7,113,999 B2	9/2006	Pestoni et al.	7,474,677 B2	1/2009	Trott
7,115,017 B1	10/2006	Laursen et al.	7,483,538 B2	1/2009	McCarty et al.
7,120,168 B2	10/2006	Zimmermann	7,483,540 B2	1/2009	Rabinowitz et al.
7,123,731 B2	10/2006	Cohen et al.	7,483,958 B1	1/2009	Elabbady et al.
7,130,316 B2	10/2006	Kovacevic	7,490,044 B2	2/2009	Kulkarni
7,130,368 B1	10/2006	Aweya et al.	7,492,912 B2	2/2009	Chung et al.
7,130,608 B2	10/2006	Hollstrom et al.	7,505,889 B2	3/2009	Salmonsén et al.
7,130,616 B2	10/2006	Janik	7,509,181 B2	3/2009	Champion
7,136,934 B2	11/2006	Carter et al.	7,519,188 B2	4/2009	Berardi et al.
7,139,981 B2	11/2006	Mayer et al.	7,519,667 B1	4/2009	Capps
7,143,141 B1	11/2006	Morgan et al.	7,532,862 B2	5/2009	Cheshire
7,143,939 B2	12/2006	Henzerling	7,539,551 B2	5/2009	Komura et al.
7,146,260 B2	12/2006	Preston et al.	7,548,744 B2	6/2009	Oesterling et al.
7,158,488 B2	1/2007	Fujimori	7,548,851 B1	6/2009	Lau et al.
7,158,783 B2	1/2007	Eguchi	7,558,224 B1	7/2009	Surazski et al.
			7,558,635 B1	7/2009	Thiel et al.
			7,561,697 B2	7/2009	Harris
			7,561,932 B1	7/2009	Holmes et al.
			7,571,014 B1	8/2009	Lambourne et al.

US 10,848,885 B2

Page 5

(56)

References Cited

U.S. PATENT DOCUMENTS

7,574,274 B2	8/2009	Holmes	7,987,294 B2	7/2011	Bryce et al.
7,581,096 B2	8/2009	Balfanz et al.	7,995,732 B2	8/2011	Koch et al.
7,599,685 B2	10/2009	Goldberg et al.	7,996,566 B1	8/2011	Sylvain et al.
7,606,174 B2	10/2009	Ochi et al.	7,996,588 B2	8/2011	Subbiah et al.
7,620,468 B2	11/2009	Shimizu	8,014,423 B2	9/2011	Thaler et al.
7,626,952 B2	12/2009	Slemmer et al.	8,015,306 B2	9/2011	Bowman
7,627,825 B2	12/2009	Kakuda	8,020,023 B2	9/2011	Millington et al.
7,630,500 B1	12/2009	Beckman et al.	8,023,663 B2	9/2011	Goldberg
7,630,501 B2	12/2009	Blank et al.	8,028,038 B2	9/2011	Weel
7,631,119 B2	12/2009	Moore et al.	8,028,323 B2	9/2011	Weel
7,634,093 B2	12/2009	McGrath	8,041,062 B2	10/2011	Cohen et al.
7,643,894 B2	1/2010	Braithwaite et al.	8,045,721 B2	10/2011	Burgan et al.
7,653,344 B1	1/2010	Feldman et al.	8,045,952 B2	10/2011	Qureshey et al.
7,657,224 B2	2/2010	Goldberg et al.	8,050,203 B2	11/2011	Jacobsen et al.
7,657,255 B2	2/2010	Abel et al.	8,050,652 B2	11/2011	Qureshey et al.
7,657,644 B1	2/2010	Zheng	8,054,987 B2	11/2011	Seydoux
7,657,910 B1	2/2010	McAulay et al.	8,055,364 B2	11/2011	Champion
7,665,115 B2	2/2010	Gallo et al.	8,063,698 B2	11/2011	Howard
7,668,990 B2	2/2010	Krzyzanowski et al.	8,074,253 B1	12/2011	Nathan
7,669,113 B1	2/2010	Moore et al.	8,086,287 B2	12/2011	Mooney et al.
7,669,219 B2	2/2010	Scott, III	8,086,752 B2	12/2011	Millington et al.
7,672,470 B2	3/2010	Lee	8,090,317 B2	1/2012	Burge et al.
7,675,943 B2	3/2010	Mosig et al.	8,103,009 B2	1/2012	McCarty et al.
7,676,044 B2	3/2010	Sasaki et al.	8,111,132 B2	2/2012	Allen et al.
7,676,142 B1	3/2010	Hung	8,112,032 B2	2/2012	Ko et al.
7,688,306 B2	3/2010	Wehrenberg et al.	8,116,476 B2	2/2012	Inohara
7,689,304 B2	3/2010	Sasaki	8,126,172 B2	2/2012	Horbach et al.
7,689,305 B2	3/2010	Kreifeldt et al.	8,131,389 B1	3/2012	Hardwick et al.
7,690,017 B2	3/2010	Stecyk et al.	8,131,390 B2	3/2012	Braithwaite et al.
7,702,279 B2	4/2010	Ko et al.	8,134,650 B2	3/2012	Maxson et al.
7,702,403 B1	4/2010	Gladwin et al.	8,135,141 B2	3/2012	Shiba
7,710,941 B2	5/2010	Rietschel et al.	8,139,774 B2	3/2012	Berardi et al.
7,711,774 B1	5/2010	Rothschild	8,144,883 B2	3/2012	Pdersen et al.
7,716,375 B2	5/2010	Blum et al.	8,148,622 B2	4/2012	Rothkopf et al.
7,720,096 B2	5/2010	Klemets	8,150,079 B2	4/2012	Maeda et al.
7,721,032 B2	5/2010	Bushell et al.	8,156,337 B2	4/2012	Balfanz et al.
7,742,740 B2	6/2010	Goldberg et al.	8,160,281 B2	4/2012	Kim et al.
7,742,832 B1	6/2010	Feldman et al.	8,169,938 B2	5/2012	Duchscher et al.
7,743,009 B2	6/2010	Hangartner et al.	8,170,222 B2	5/2012	Dunko
7,746,906 B2	6/2010	Jinzaki et al.	8,170,260 B2	5/2012	Reining et al.
7,752,329 B1	7/2010	Meenan et al.	8,175,292 B2	5/2012	Aylward et al.
7,757,076 B2	7/2010	Stewart et al.	8,175,297 B1	5/2012	Ho et al.
7,761,176 B2	7/2010	Ben-Yaacov et al.	8,185,674 B2	5/2012	Moore et al.
7,765,315 B2	7/2010	Batson et al.	8,189,824 B2	5/2012	Strauss et al.
RE41,608 E	8/2010	Blair et al.	8,194,874 B2	6/2012	Starobin et al.
7,792,311 B1	9/2010	Holmgren et al.	8,204,890 B1	6/2012	Gogan et al.
7,793,206 B2	9/2010	Lim et al.	8,208,653 B2	6/2012	Eo et al.
7,804,972 B2	9/2010	Melanson	8,214,447 B2	7/2012	Deslippe et al.
7,805,210 B2	9/2010	Cucos et al.	8,214,740 B2	7/2012	Johnson
7,817,960 B2	10/2010	Tan et al.	8,214,873 B2	7/2012	Weel
7,827,259 B2	11/2010	Heller et al.	8,218,790 B2	7/2012	Bull et al.
7,831,054 B2	11/2010	Ball et al.	8,229,125 B2	7/2012	Short
7,835,689 B2	11/2010	Goldberg et al.	8,230,099 B2	7/2012	Weel
7,849,181 B2	12/2010	Slemmer et al.	8,233,029 B2	7/2012	Yoshida et al.
7,853,341 B2	12/2010	McCarty et al.	8,233,632 B1	7/2012	Macdonald et al.
7,865,137 B2	1/2011	Goldberg et al.	8,233,635 B2	7/2012	Shiba
7,882,234 B2	2/2011	Watanabe et al.	8,233,648 B2	7/2012	Sorek et al.
7,885,622 B2	2/2011	Krampf et al.	8,234,395 B2	7/2012	Millington et al.
7,899,656 B2	3/2011	Crutchfield, Jr.	8,238,578 B2	8/2012	Aylward
7,904,720 B2	3/2011	Smetters et al.	8,239,559 B2	8/2012	Rajapakse
7,907,736 B2	3/2011	Yuen et al.	8,239,748 B1	8/2012	Moore et al.
7,907,819 B2	3/2011	Ando et al.	8,243,961 B1	8/2012	Morrill
7,916,861 B2	3/2011	Conley et al.	8,250,218 B2	8/2012	Watanabe et al.
7,916,877 B2	3/2011	Goldberg et al.	8,265,310 B2	9/2012	Berardi et al.
7,917,082 B2	3/2011	Goldberg et al.	8,270,631 B2	9/2012	Kusunoki
7,933,418 B2	4/2011	Morishima	8,279,709 B2	10/2012	Choisel et al.
7,934,239 B1	4/2011	Dagman	8,281,001 B2	10/2012	Busam et al.
7,937,089 B2	5/2011	Smetters et al.	8,285,404 B1	10/2012	Kekki
7,937,752 B2	5/2011	Balfanz et al.	8,290,185 B2	10/2012	Kim
7,945,636 B2	5/2011	Nelson et al.	8,290,603 B1	10/2012	Lambourne et al.
7,945,708 B2	5/2011	Ohkita	8,300,845 B2	10/2012	Zurek et al.
7,958,441 B2	6/2011	Heller et al.	8,306,235 B2	11/2012	Mahowald
7,962,482 B2	6/2011	Handman et al.	8,311,226 B2	11/2012	Lorgeoux et al.
7,966,388 B1	6/2011	Pugaczewski et al.	8,315,555 B2	11/2012	Ko et al.
7,975,051 B2	7/2011	Saint Clair et al.	8,316,147 B2	11/2012	Batson et al.
			8,325,931 B2	12/2012	Howard et al.
			8,325,935 B2	12/2012	Rutschman
			8,331,585 B2	12/2012	Hagen et al.
			8,340,330 B2	12/2012	Yoon et al.

US 10,848,885 B2

Page 6

(56)

References Cited

U.S. PATENT DOCUMENTS

8,345,709 B2	1/2013	Nitzpon et al.	8,984,442 B2	3/2015	Pirnack et al.
8,364,295 B2	1/2013	Beckmann et al.	9,014,833 B2	4/2015	Goh et al.
8,370,678 B2	2/2013	Millington et al.	9,020,153 B2	4/2015	Britt, Jr.
8,374,595 B2	2/2013	Chien et al.	9,042,556 B2	5/2015	Kallai et al.
8,391,501 B2	3/2013	Khawand et al.	9,078,281 B2	7/2015	Matsuda et al.
8,407,623 B2	3/2013	Kerr et al.	9,112,622 B2	8/2015	Miyata et al.
8,411,883 B2	4/2013	Matsumoto	9,137,602 B2	9/2015	Mayman et al.
8,423,659 B2	4/2013	Millington	9,160,965 B2	10/2015	Redmann et al.
8,423,893 B2	4/2013	Ramsay et al.	9,195,258 B2	11/2015	Millington
8,432,851 B2	4/2013	Xu et al.	9,219,959 B2	12/2015	Kallai et al.
8,433,076 B2	4/2013	Zurek et al.	9,226,073 B2	12/2015	Ramos et al.
8,442,239 B2	5/2013	Bruelle-Drews et al.	9,245,514 B2	1/2016	Donaldson
8,452,020 B2	5/2013	Gregg et al.	9,325,286 B1	4/2016	Yang
8,457,334 B2	6/2013	Yoon et al.	9,344,206 B2 *	5/2016	Lambourne G06F 3/16
8,463,184 B2	6/2013	Dua	9,524,098 B2	12/2016	Griffiths et al.
8,463,875 B2	6/2013	Katz et al.	9,560,448 B2	1/2017	Hartung
8,473,844 B2	6/2013	Kreifeldt et al.	9,998,321 B2	6/2018	Cheshire
8,477,958 B2	7/2013	Moeller et al.	2001/0001160 A1	5/2001	Shoff et al.
8,483,853 B1 *	7/2013	Lambourne G06F 3/165 700/94	2001/0009604 A1	7/2001	Ando et al.
8,498,726 B2	7/2013	Kim et al.	2001/0020193 A1	9/2001	Teramachi et al.
8,509,211 B2	8/2013	Trotter et al.	2001/0022823 A1	9/2001	Renaud
8,509,463 B2	8/2013	Goh et al.	2001/0027498 A1	10/2001	Van De Meulenhof et al.
8,515,389 B2	8/2013	Smetters et al.	2001/0032188 A1	10/2001	Miyabe et al.
8,520,870 B2	8/2013	Sato et al.	2001/0042107 A1	11/2001	Palm
8,565,455 B2	10/2013	Worrell et al.	2001/0043456 A1	11/2001	Atkinson
8,577,045 B2	11/2013	Gibbs	2001/0046235 A1	11/2001	Trevitt et al.
8,577,048 B2	11/2013	Chaikin et al.	2001/0047377 A1	11/2001	Sincaglia et al.
8,588,432 B1	11/2013	Simon	2001/0050991 A1	12/2001	Eves
8,588,949 B2	11/2013	Lambourne et al.	2001/0055950 A1	12/2001	Davies et al.
8,600,075 B2	12/2013	Lim	2002/0002039 A1	1/2002	Qureshey et al.
8,600,084 B1	12/2013	Garrett	2002/0002562 A1	1/2002	Moran et al.
8,601,394 B2	12/2013	Sheehan et al.	2002/0002565 A1	1/2002	Ohyama
8,611,559 B2	12/2013	Sanders	2002/0003548 A1	1/2002	Krusche et al.
8,615,091 B2	12/2013	Terwal	2002/0015003 A1	2/2002	Kato et al.
8,620,006 B2	12/2013	Berardi et al.	2002/0022453 A1	2/2002	Balog et al.
8,639,830 B2	1/2014	Bowman	2002/0026442 A1	2/2002	Lipscomb et al.
8,654,995 B2	2/2014	Silber et al.	2002/0034374 A1	3/2002	Barton
8,672,744 B1	3/2014	Gronkowski et al.	2002/0042844 A1	4/2002	Chiazzese
8,683,009 B2	3/2014	Ng et al.	2002/0049843 A1	4/2002	Barone et al.
8,688,431 B2	4/2014	Lyons et al.	2002/0062406 A1	5/2002	Chang et al.
8,700,730 B2	4/2014	Rowe	2002/0065926 A1	5/2002	Hackney et al.
8,731,206 B1	5/2014	Park	2002/0067909 A1	6/2002	Iivonen
8,750,282 B2	6/2014	Gelter et al.	2002/0072816 A1	6/2002	Shdema et al.
8,751,026 B2	6/2014	Sato et al.	2002/0072817 A1	6/2002	Champion
8,762,565 B2	6/2014	Togashi et al.	2002/0073228 A1	6/2002	Cognet et al.
8,768,252 B2	7/2014	Watson et al.	2002/0078161 A1	6/2002	Cheng
8,775,546 B2	7/2014	Millington	2002/0078293 A1	6/2002	Kou et al.
8,788,080 B1	7/2014	Kallai et al.	2002/0080783 A1	6/2002	Fujimori et al.
8,797,926 B2	8/2014	Kearney, III et al.	2002/0083172 A1	6/2002	Knowles et al.
8,818,538 B2	8/2014	Sakata	2002/0083342 A1	6/2002	Webb et al.
8,819,554 B2	8/2014	Basso et al.	2002/0090914 A1	7/2002	Kang et al.
8,843,224 B2	9/2014	Holmgren et al.	2002/0093478 A1	7/2002	Yeh
8,843,228 B2 *	9/2014	Lambourne G05B 15/02 700/94	2002/0095460 A1	7/2002	Benson
8,843,586 B2	9/2014	Pantos et al.	2002/0098878 A1	7/2002	Mooney et al.
8,855,319 B2	10/2014	Liu et al.	2002/0101357 A1	8/2002	Gharapetian
8,861,739 B2	10/2014	Ojanpera	2002/0103635 A1	8/2002	Mesarovic et al.
8,879,761 B2	11/2014	Johnson et al.	2002/0109710 A1	8/2002	Holtz et al.
8,885,851 B2	11/2014	Westenbroek	2002/0112084 A1	8/2002	Deen et al.
8,886,347 B2	11/2014	Lambourne	2002/0112244 A1	8/2002	Liou et al.
8,904,066 B2	12/2014	Moore et al.	2002/0114354 A1	8/2002	Sinha et al.
8,914,559 B2	12/2014	Kalayjian et al.	2002/0114359 A1	8/2002	Ibaraki et al.
8,917,877 B2	12/2014	Haafi et al.	2002/0124097 A1	9/2002	Isely et al.
8,923,997 B2	12/2014	Kallai et al.	2002/0129128 A1	9/2002	Gold et al.
8,930,006 B2	1/2015	Haatainen	2002/0129156 A1	9/2002	Yoshikawa
8,934,647 B2	1/2015	Joyce et al.	2002/0131398 A1	9/2002	Taylor
8,934,655 B2	1/2015	Breen et al.	2002/0131761 A1	9/2002	Kawasaki et al.
8,942,252 B2	1/2015	Balassanian et al.	2002/0136335 A1	9/2002	Liou et al.
8,942,395 B2	1/2015	Lissaman et al.	2002/0137505 A1	9/2002	Eiche et al.
8,954,177 B2	2/2015	Sanders	2002/0143547 A1	10/2002	Fay et al.
8,965,544 B2	2/2015	Ramsay	2002/0143998 A1	10/2002	Rajagopal et al.
8,965,546 B2	2/2015	Visser et al.	2002/0146981 A1	10/2002	Saint-Hilaire et al.
8,966,394 B2	2/2015	Gates et al.	2002/0150053 A1	10/2002	Gray et al.
8,977,974 B2	3/2015	Kraut	2002/0159596 A1	10/2002	Durand et al.
			2002/0163361 A1	11/2002	Parkin
			2002/0165721 A1	11/2002	Chang et al.
			2002/0165921 A1	11/2002	Sapieyevski
			2002/0168938 A1	11/2002	Chang
			2002/0173273 A1	11/2002	Spurgat et al.
			2002/0174243 A1	11/2002	Spurgat et al.

US 10,848,885 B2

Page 7

(56)

References Cited

U.S. PATENT DOCUMENTS

2002/0177411	A1	11/2002	Yajima et al.	2004/0019807	A1	1/2004	Freund et al.
2002/0181355	A1	12/2002	Shikunami et al.	2004/0019911	A1	1/2004	Gates et al.
2002/0184310	A1	12/2002	Traversat et al.	2004/0023697	A1	2/2004	Komura
2002/0188762	A1	12/2002	Tomassetti et al.	2004/0024478	A1	2/2004	Hans et al.
2002/0194309	A1	12/2002	Carter et al.	2004/0024925	A1	2/2004	Cypher et al.
2002/0196951	A1	12/2002	Tsai	2004/0027166	A1	2/2004	Mangum et al.
2003/0002609	A1	1/2003	Faller et al.	2004/0032348	A1	2/2004	Lai et al.
2003/0002689	A1	1/2003	Folio	2004/0032421	A1	2/2004	Williamson et al.
2003/0002849	A1	1/2003	Lord	2004/0037433	A1	2/2004	Chen
2003/0008616	A1	1/2003	Anderson	2004/0041836	A1	3/2004	Zaner et al.
2003/0014486	A1	1/2003	May	2004/0042629	A1	3/2004	Mellone et al.
2003/0018797	A1	1/2003	Dunning et al.	2004/0044742	A1	3/2004	Evron et al.
2003/0020763	A1	1/2003	Mayer et al.	2004/0048569	A1	3/2004	Kawamura
2003/0023411	A1	1/2003	Witmer et al.	2004/0059842	A1	3/2004	Hanson et al.
2003/0023741	A1	1/2003	Tomassetti et al.	2004/0059965	A1	3/2004	Marshall et al.
2003/0031333	A1	2/2003	Cohen et al.	2004/0066736	A1	4/2004	Kroeger
2003/0035072	A1	2/2003	Hagg	2004/0071299	A1	4/2004	Yoshino
2003/0035444	A1	2/2003	Zwack	2004/0075767	A1	4/2004	Neuman et al.
2003/0041173	A1	2/2003	Hoyle	2004/0078383	A1	4/2004	Mercer et al.
2003/0041174	A1	2/2003	Wen et al.	2004/0080671	A1	4/2004	Siemens et al.
2003/0043856	A1	3/2003	Lakaniemi et al.	2004/0093096	A1	5/2004	Huang et al.
2003/0043924	A1	3/2003	Haddad et al.	2004/0098754	A1	5/2004	Vella et al.
2003/0046703	A1	3/2003	Knowles et al.	2004/0111473	A1	6/2004	Lysenko et al.
2003/0050058	A1	3/2003	Walsh et al.	2004/0114771	A1	6/2004	Vaughan et al.
2003/0055892	A1	3/2003	Huitema et al.	2004/0117044	A1	6/2004	Konetski
2003/0056220	A1	3/2003	Thornton	2004/0117462	A1	6/2004	Bodin et al.
2003/0061428	A1	3/2003	Garney et al.	2004/0128701	A1	7/2004	Kaneko et al.
2003/0063755	A1	4/2003	Nourse et al.	2004/0131192	A1	7/2004	Metcalf
2003/0066094	A1	4/2003	Van Der Schaar et al.	2004/0133689	A1	7/2004	Vasisht et al.
2003/0067437	A1	4/2003	McClintock et al.	2004/0143368	A1	7/2004	May et al.
2003/0073432	A1	4/2003	Meade	2004/0143852	A1	7/2004	Meyers
2003/0091322	A1	5/2003	Van	2004/0147224	A1	7/2004	Lee
2003/0097478	A1	5/2003	King	2004/0148237	A1	7/2004	Bittmann et al.
2003/0099212	A1	5/2003	Anjum et al.	2004/0168081	A1	8/2004	Ladas et al.
2003/0099221	A1	5/2003	Rhee	2004/0170383	A1	9/2004	Mazur
2003/0100335	A1	5/2003	Gassho et al.	2004/0171346	A1	9/2004	Lin
2003/0101253	A1	5/2003	Saito et al.	2004/0176025	A1	9/2004	Holm et al.
2003/0103088	A1	6/2003	Dresti et al.	2004/0177167	A1	9/2004	Iwamura et al.
2003/0103464	A1	6/2003	Wong et al.	2004/0179554	A1	9/2004	Tsao
2003/0110329	A1	6/2003	Higaki et al.	2004/0183827	A1	9/2004	Putterman et al.
2003/0126211	A1	7/2003	Anttila et al.	2004/0185773	A1	9/2004	Gerber et al.
2003/0135822	A1	7/2003	Evans	2004/0195313	A1	10/2004	Lee
2003/0157951	A1	8/2003	Hasty	2004/0203354	A1	10/2004	Yue
2003/0161479	A1	8/2003	Yang et al.	2004/0203376	A1	10/2004	Phillipps
2003/0167335	A1	9/2003	Alexander	2004/0203378	A1	10/2004	Powers
2003/0172123	A1	9/2003	Polan et al.	2004/0203590	A1	10/2004	Shteyn
2003/0177889	A1	9/2003	Koseki et al.	2004/0203936	A1	10/2004	Ogino et al.
2003/0179780	A1	9/2003	Walker et al.	2004/0208158	A1	10/2004	Fellman et al.
2003/0185400	A1	10/2003	Yoshizawa et al.	2004/0213230	A1	10/2004	Douskalis et al.
2003/0195964	A1	10/2003	Mane	2004/0214524	A1	10/2004	Noda et al.
2003/0198254	A1	10/2003	Sullivan et al.	2004/0220687	A1	11/2004	Klotz et al.
2003/0198255	A1	10/2003	Sullivan et al.	2004/0223622	A1	11/2004	Lindemann et al.
2003/0198257	A1	10/2003	Sullivan et al.	2004/0224638	A1	11/2004	Fadell et al.
2003/0200001	A1	10/2003	Goddard et al.	2004/0225389	A1	11/2004	Ledoux et al.
2003/0204273	A1	10/2003	Dinker et al.	2004/0228367	A1	11/2004	Mosig et al.
2003/0204509	A1	10/2003	Dinker et al.	2004/0248601	A1	12/2004	Chang
2003/0210796	A1	11/2003	McCarty et al.	2004/0249490	A1	12/2004	Sakai
2003/0212802	A1	11/2003	Rector et al.	2004/0249965	A1	12/2004	Huggins et al.
2003/0219007	A1	11/2003	Barrack et al.	2004/0249982	A1	12/2004	Arnold et al.
2003/0220705	A1	11/2003	Ibey	2004/0252400	A1	12/2004	Blank et al.
2003/0225834	A1	12/2003	Lee et al.	2004/0253969	A1	12/2004	Nguyen et al.
2003/0227478	A1	12/2003	Chatfield	2004/0264717	A1	12/2004	Fujita et al.
2003/0229900	A1	12/2003	Reisman	2005/0002535	A1	1/2005	Liu et al.
2003/0231208	A1	12/2003	Hanon et al.	2005/0010691	A1	1/2005	Oyadomari et al.
2003/0231871	A1	12/2003	Ushimaru	2005/0011388	A1	1/2005	Kouznetsov
2003/0235304	A1	12/2003	Evans et al.	2005/0013394	A1	1/2005	Rausch et al.
2004/0001106	A1	1/2004	Deutscher et al.	2005/0015551	A1	1/2005	Eames et al.
2004/0001484	A1	1/2004	Ozguner	2005/0021470	A1	1/2005	Martin et al.
2004/0001591	A1	1/2004	Mani et al.	2005/0021590	A1	1/2005	Debique et al.
2004/0008852	A1	1/2004	Also et al.	2005/0027821	A1	2/2005	Alexander et al.
2004/0010727	A1	1/2004	Fujinami	2005/0031135	A1	2/2005	Devantier et al.
2004/0012620	A1	1/2004	Buhler et al.	2005/0047605	A1	3/2005	Lee et al.
2004/0014426	A1	1/2004	Moore	2005/0058149	A1	3/2005	Howe
2004/0015252	A1	1/2004	Aiso et al.	2005/0060435	A1	3/2005	Xue et al.
2004/0019497	A1	1/2004	Volk et al.	2005/0062637	A1	3/2005	El Zabadani et al.
				2005/0069153	A1	3/2005	Hall et al.
				2005/0081213	A1	4/2005	Suzuoki et al.
				2005/0100166	A1	5/2005	Smetters et al.
				2005/0100174	A1	5/2005	Howard et al.

US 10,848,885 B2

Page 8

(56)

References Cited

U.S. PATENT DOCUMENTS

2005/0105052 A1	5/2005	McCormick et al.	2007/0192156 A1	8/2007	Gauger
2005/0114538 A1	5/2005	Rose	2007/0206829 A1	9/2007	Weinans et al.
2005/0120128 A1	6/2005	Willes et al.	2007/0220150 A1	9/2007	Garg
2005/0125222 A1	6/2005	Brown et al.	2007/0223725 A1	9/2007	Neumann et al.
2005/0125357 A1	6/2005	Saadat et al.	2007/0249295 A1	10/2007	Ukita et al.
2005/0129240 A1	6/2005	Balfanz et al.	2007/0265031 A1	11/2007	Koizumi et al.
2005/0131558 A1	6/2005	Braithwaite et al.	2007/0271388 A1	11/2007	Bowra et al.
2005/0144284 A1	6/2005	Ludwig et al.	2007/0288610 A1	12/2007	Saint et al.
2005/0147261 A1	7/2005	Yeh	2007/0299778 A1	12/2007	Haveson et al.
2005/0149204 A1	7/2005	Manchester et al.	2008/0002836 A1	1/2008	Moeller et al.
2005/0154766 A1	7/2005	Huang et al.	2008/0007649 A1	1/2008	Bennett
2005/0159833 A1	7/2005	Giaimo et al.	2008/0007650 A1	1/2008	Bennett
2005/0160270 A1	7/2005	Goldberg et al.	2008/0007651 A1	1/2008	Bennett
2005/0166135 A1	7/2005	Burke et al.	2008/0018785 A1	1/2008	Bennett
2005/0168630 A1	8/2005	Yamada et al.	2008/0022320 A1	1/2008	Ver Steeg
2005/0177256 A1	8/2005	Shintani et al.	2008/0025535 A1	1/2008	Rajapakse
2005/0177643 A1	8/2005	Xu	2008/0045140 A1	2/2008	Korhonen et al.
2005/0181348 A1	8/2005	Carey et al.	2008/0065232 A1	3/2008	Igoe
2005/0195205 A1	9/2005	Abrams, Jr.	2008/0066094 A1	3/2008	Igoe
2005/0195823 A1	9/2005	Chen et al.	2008/0066120 A1	3/2008	Igoe
2005/0195999 A1	9/2005	Takemura et al.	2008/0072816 A1	3/2008	Riess et al.
2005/0197725 A1	9/2005	Alexander et al.	2008/0075295 A1	3/2008	Mayman et al.
2005/0198574 A1	9/2005	Lamkin et al.	2008/0077261 A1	3/2008	Baudino et al.
2005/0201549 A1	9/2005	Dedieu et al.	2008/0077619 A1	3/2008	Gilley et al.
2005/0216556 A1	9/2005	Manion et al.	2008/0077620 A1	3/2008	Gilley et al.
2005/0254505 A1	11/2005	Chang et al.	2008/0086318 A1	4/2008	Gilley et al.
2005/0262217 A1	11/2005	Nonaka et al.	2008/0091771 A1	4/2008	Allen et al.
2005/0266798 A1	12/2005	Moloney et al.	2008/0092204 A1	4/2008	Bryce et al.
2005/0266826 A1	12/2005	Vlad	2008/0109852 A1	5/2008	Kretz et al.
2005/0281255 A1	12/2005	Davies et al.	2008/0120429 A1	5/2008	Millington et al.
2005/0283820 A1	12/2005	Richards et al.	2008/0126943 A1	5/2008	Parasnis et al.
2005/0288805 A1	12/2005	Moore et al.	2008/0144861 A1	6/2008	Melanson et al.
2005/0289224 A1	12/2005	Deslippe et al.	2008/0144864 A1	6/2008	Huon et al.
2005/0289244 A1	12/2005	Sahu et al.	2008/0146289 A1	6/2008	Korneluk et al.
2006/0041616 A1	2/2006	Ludwig et al.	2008/0152165 A1	6/2008	Zacchi
2006/0041639 A1	2/2006	Lamkin et al.	2008/0159545 A1	7/2008	Takumai et al.
2006/0045281 A1	3/2006	Korneluk et al.	2008/0162668 A1	7/2008	Miller
2006/0072489 A1	4/2006	Toyoshima	2008/0189272 A1	8/2008	Powers et al.
2006/0095516 A1	5/2006	Wijeratne	2008/0205070 A1	8/2008	Osada
2006/0098936 A1	5/2006	Ikeda et al.	2008/0212786 A1	9/2008	Park
2006/0119497 A1	6/2006	Miller et al.	2008/0215169 A1	9/2008	Debettencourt et al.
2006/0143236 A1	6/2006	Wu	2008/0242222 A1	10/2008	Bryce et al.
2006/0149402 A1	7/2006	Chung	2008/0247554 A1	10/2008	Caffrey
2006/0155721 A1	7/2006	Grunwald et al.	2008/0263010 A1	10/2008	Roychoudhuri et al.
2006/0173844 A1	8/2006	Zhang et al.	2008/0273714 A1	11/2008	Hartung
2006/0179160 A1	8/2006	Uehara et al.	2008/0291863 A1	11/2008	Agren et al.
2006/0193454 A1	8/2006	Abou-Chakra et al.	2008/0303947 A1	12/2008	Ohnishi et al.
2006/0193482 A1	8/2006	Harvey et al.	2009/0011798 A1	1/2009	Yamada
2006/0199538 A1	9/2006	Eisenbach	2009/0017868 A1	1/2009	Ueda et al.
2006/0205349 A1	9/2006	Passier et al.	2009/0031336 A1	1/2009	Chavez et al.
2006/0222186 A1	10/2006	Paige et al.	2009/0060219 A1	3/2009	Inohara
2006/0227985 A1	10/2006	Kawanami	2009/0070434 A1	3/2009	Himmelstein
2006/0229752 A1	10/2006	Chung	2009/0087000 A1	4/2009	Ko
2006/0259649 A1	11/2006	Hsieh et al.	2009/0089327 A1	4/2009	Kalaboukis et al.
2006/0265571 A1	11/2006	Bosch et al.	2009/0097672 A1	4/2009	Buil et al.
2006/0270395 A1	11/2006	Dhawan et al.	2009/0100189 A1	4/2009	Bahren et al.
2006/0281409 A1	12/2006	Levien et al.	2009/0124289 A1	5/2009	Nishida
2006/0287746 A1	12/2006	Braithwaite et al.	2009/0157905 A1	6/2009	Davis
2006/0294569 A1	12/2006	Chung	2009/0164655 A1	6/2009	Pettersson et al.
2007/0003067 A1	1/2007	Gierl et al.	2009/0169030 A1	7/2009	Inohara
2007/0003075 A1	1/2007	Cooper et al.	2009/0180632 A1	7/2009	Goldberg et al.
2007/0022207 A1	1/2007	Millington et al.	2009/0193345 A1	7/2009	Wensley et al.
2007/0038999 A1	2/2007	Millington et al.	2009/0222115 A1	9/2009	Malcolm et al.
2007/0043847 A1	2/2007	Carter et al.	2009/0228919 A1	9/2009	Zott et al.
2007/0047712 A1	3/2007	Gross et al.	2009/0232326 A1	9/2009	Gordon et al.
2007/0048713 A1	3/2007	Plastina et al.	2009/0251604 A1	10/2009	Iyer
2007/0054680 A1	3/2007	Mo et al.	2010/0004983 A1	1/2010	Dickerson et al.
2007/0071255 A1	3/2007	Schobben	2010/0010651 A1	1/2010	Kirkeby et al.
2007/0087686 A1	4/2007	Holm et al.	2010/0031366 A1	2/2010	Knight et al.
2007/0142022 A1	6/2007	Madonna et al.	2010/0049835 A1	2/2010	Ko et al.
2007/0142944 A1	6/2007	Goldberg et al.	2010/0052843 A1	3/2010	Cannistraro
2007/0143493 A1	6/2007	Mullig et al.	2010/0067716 A1	3/2010	Katayama
2007/0169115 A1	7/2007	Ko et al.	2010/0087089 A1	4/2010	Struthers et al.
2007/0180137 A1	8/2007	Rajapakse	2010/0142735 A1	6/2010	Yoon et al.
2007/0189544 A1	8/2007	Rosenberg	2010/0153097 A1	6/2010	Hotho et al.
			2010/0228740 A1	9/2010	Cannistraro et al.
			2010/0272270 A1	10/2010	Chaikin et al.
			2010/0284389 A1	11/2010	Ramsay et al.
			2010/0290643 A1	11/2010	Mihelich et al.

US 10,848,885 B2

Page 9

(56) References Cited

U.S. PATENT DOCUMENTS

2010/0299639 A1 11/2010 Ramsay et al.
 2011/0001632 A1 1/2011 Hohorst
 2011/0002487 A1 1/2011 Panther et al.
 2011/0044476 A1 2/2011 Burlingame et al.
 2011/0066943 A1 3/2011 Brillon et al.
 2011/0110533 A1 5/2011 Choi et al.
 2011/0170710 A1 7/2011 Son
 2011/0222701 A1 9/2011 Donaldson et al.
 2011/0228944 A1 9/2011 Croghan et al.
 2011/0299696 A1 12/2011 Holmgren et al.
 2011/0316768 A1 12/2011 McRae
 2012/0029671 A1 2/2012 Millington et al.
 2012/0030366 A1 2/2012 Collart et al.
 2012/0047435 A1 2/2012 Holladay et al.
 2012/0051558 A1 3/2012 Kim et al.
 2012/0051567 A1 3/2012 Castor-Perry
 2012/0060046 A1 3/2012 Millington
 2012/0127831 A1 5/2012 Gicklhorn et al.
 2012/0129446 A1 5/2012 Ko et al.
 2012/0148075 A1 6/2012 Goh et al.
 2012/0185771 A1 7/2012 Rothkopf et al.
 2012/0192071 A1 7/2012 Millington
 2012/0207290 A1 8/2012 Moyers et al.
 2012/0237054 A1 9/2012 Eo et al.
 2012/0263325 A1 10/2012 Freeman et al.
 2012/0281058 A1 11/2012 Laney et al.
 2012/0290621 A1 11/2012 Heitz, III et al.
 2013/0010970 A1 1/2013 Hegarty et al.
 2013/0018960 A1 1/2013 Knysz et al.
 2013/0028443 A1 1/2013 Pance et al.
 2013/0031475 A1 1/2013 Maor et al.
 2013/0038726 A1 2/2013 Kim
 2013/0041954 A1 2/2013 Kim et al.
 2013/0047084 A1 2/2013 Sanders et al.
 2013/0051572 A1 2/2013 Goh et al.
 2013/0052940 A1 2/2013 Brillhart et al.
 2013/0070093 A1 3/2013 Rivera et al.
 2013/0080599 A1 3/2013 Ko et al.
 2013/0094670 A1 4/2013 Millington
 2013/0124664 A1 5/2013 Fonseca, Jr. et al.
 2013/0129122 A1 5/2013 Johnson et al.
 2013/0132837 A1 5/2013 Mead et al.
 2013/0159126 A1 6/2013 Elkady
 2013/0167029 A1 6/2013 Friesen et al.
 2013/0174100 A1 7/2013 Seymour et al.
 2013/0174223 A1 7/2013 Dykeman et al.
 2013/0179163 A1 7/2013 Herbig et al.
 2013/0191454 A1 7/2013 Oliver et al.
 2013/0197682 A1 8/2013 Millington
 2013/0208911 A1 8/2013 Millington
 2013/0208921 A1 8/2013 Millington
 2013/0226323 A1 8/2013 Millington
 2013/0230175 A1 9/2013 Bech et al.
 2013/0232416 A1 9/2013 Millington
 2013/0236029 A1 9/2013 Millington
 2013/0243199 A1 9/2013 Kallai et al.
 2013/0253679 A1 9/2013 Lambourne
 2013/0253934 A1 9/2013 Parekh et al.
 2013/0259254 A1 10/2013 Xiang et al.
 2013/0279706 A1 10/2013 Marti et al.
 2013/0287186 A1 10/2013 Quady
 2013/0290504 A1 10/2013 Quady
 2013/0293345 A1 11/2013 Lambourne
 2014/0006483 A1 1/2014 Garmark et al.
 2014/0016784 A1 1/2014 Sen et al.
 2014/0016786 A1 1/2014 Sen
 2014/0016802 A1 1/2014 Sen
 2014/0023196 A1 1/2014 Xiang et al.
 2014/0037097 A1 2/2014 Labosco
 2014/0064501 A1 3/2014 Olsen et al.
 2014/0075308 A1 3/2014 Sanders et al.
 2014/0075311 A1 3/2014 Boettcher et al.
 2014/0079242 A1 3/2014 Nguyen et al.
 2014/0108929 A1 4/2014 Garmark et al.
 2014/0112481 A1 4/2014 Li et al.

2014/0123005 A1 5/2014 Forstall et al.
 2014/0140530 A1 5/2014 Gomes-Casseres et al.
 2014/0161265 A1 6/2014 Chaikin et al.
 2014/0181569 A1 6/2014 Millington et al.
 2014/0219456 A1 8/2014 Morrell et al.
 2014/0226823 A1 8/2014 Sen et al.
 2014/0242913 A1 8/2014 Pang
 2014/0256260 A1 9/2014 Ueda et al.
 2014/0267148 A1 9/2014 Luna et al.
 2014/0270202 A1 9/2014 Ivanov et al.
 2014/0273859 A1 9/2014 Luna et al.
 2014/0279889 A1 9/2014 Luna et al.
 2014/0285313 A1 9/2014 Luna et al.
 2014/0286496 A1 9/2014 Luna et al.
 2014/0294200 A1 10/2014 Baumgarte et al.
 2014/0298174 A1 10/2014 Ikononov
 2014/0323036 A1 10/2014 Daley et al.
 2014/0344689 A1 11/2014 Scott et al.
 2014/0355768 A1 12/2014 Sen et al.
 2014/0355794 A1 12/2014 Morrell et al.
 2014/0378056 A1 12/2014 Liu et al.
 2015/0019670 A1 1/2015 Redmann
 2015/0026613 A1 1/2015 Kwon et al.
 2015/0032844 A1 1/2015 Tarr et al.
 2015/0043736 A1 2/2015 Olsen et al.
 2015/0049248 A1 2/2015 Wang et al.
 2015/0063610 A1 3/2015 Mossner
 2015/0074527 A1 3/2015 Sevigny et al.
 2015/0074528 A1 3/2015 Sakalowsky et al.
 2015/0098576 A1 4/2015 Sundaresan et al.
 2015/0139210 A1 5/2015 Marin et al.
 2015/0146886 A1 5/2015 Baumgarte
 2015/0201274 A1 7/2015 Ellner et al.
 2015/0256954 A1 9/2015 Carlsson et al.
 2015/0281866 A1 10/2015 Williams et al.
 2015/0286360 A1 10/2015 Wachter et al.
 2015/0304288 A1 10/2015 Balasaygun et al.
 2015/0365987 A1 12/2015 Weel
 2016/0234615 A1* 8/2016 Lambourne H03G 1/02
 2017/0188152 A1 6/2017 Watson et al.

FOREIGN PATENT DOCUMENTS

CN 101095372 A 12/2007
 CN 101292500 A 10/2008
 CN 101785182 A 7/2010
 EP 0251584 A2 1/1988
 EP 0672985 A1 9/1995
 EP 0772374 A2 5/1997
 EP 1058985 A2 12/2000
 EP 1111527 A2 6/2001
 EP 1122931 A2 8/2001
 EP 1133896 B1 8/2002
 EP 1312188 A1 5/2003
 EP 1389853 A1 2/2004
 EP 2713281 4/2004
 EP 1517464 A2 3/2005
 EP 0895427 A3 1/2006
 EP 1416687 B1 8/2006
 EP 1410686 3/2008
 EP 2043381 A2 4/2009
 EP 2161950 A2 3/2010
 EP 1825713 B1 10/2012
 EP 0742674 B1 4/2014
 EP 2591617 B1 6/2014
 EP 2860992 A1 4/2015
 GB 2284327 A 5/1995
 GB 2338374 12/1999
 GB 2379533 A 3/2003
 GB 2486183 6/2012
 JP 63269633 11/1988
 JP 07-210129 8/1995
 JP 2000149391 A 5/2000
 JP 2001034951 2/2001
 JP 2002111817 4/2002
 JP 2002123267 A 4/2002
 JP 2002358241 A 12/2002
 JP 2003037585 2/2003
 JP 2003506765 A 2/2003

US 10,848,885 B2

Page 10

(56)

References Cited

FOREIGN PATENT DOCUMENTS

JP	2003101958	4/2003
JP	2003169089 A	6/2003
JP	2004193868 A	7/2004
JP	2005108427	4/2005
JP	2005136457	5/2005
JP	2007241652 A	9/2007
JP	2007288405 A	11/2007
JP	2009506603 A	2/2009
JP	2009135750	6/2009
JP	2009218888	9/2009
JP	2009535708	10/2009
JP	2009538006 A	10/2009
JP	2011010183 A	1/2011
JP	2011130496	6/2011
JP	2011176581	9/2011
KR	20030011128 A	2/2003
KR	20060030713 A	4/2006
TW	439027	6/2001
WO	199525313	9/1995
WO	9709756 A2	3/1997
WO	1999023560	5/1999
WO	199961985	12/1999
WO	0019693 A1	4/2000
WO	2000019693 A1	4/2000
WO	0110125 A1	2/2001
WO	200153994	7/2001
WO	02073851	9/2002
WO	03093950 A2	11/2003
WO	03096741 A2	11/2003
WO	2003093950 A2	11/2003
WO	2005013047 A2	2/2005
WO	2007023120 A1	3/2007
WO	2007127485	11/2007
WO	2007131555	11/2007
WO	2007135581 A2	11/2007
WO	2008046530 A2	4/2008
WO	2008082350 A1	7/2008
WO	2008114389 A1	9/2008
WO	2012050927	4/2012
WO	2012137190 A1	10/2012
WO	2013012582	1/2013
WO	2014004182	1/2014
WO	2014149533 A2	9/2014
WO	2015024881 A1	2/2015

OTHER PUBLICATIONS

Renkus Heinz Manual; available for sale at least 2004, 6 pages.
 Request for Ex Parte Reexamination submitted in U.S. Pat. No. 9,213,357 on May 22, 2017, 85 pages.
 "Residential Distributed Audio Wiring Practices," Leviton Network Solutions, 2001, 13 pages.
 Ritchie et al., "MediaServer:1 Device Template Version 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 12 pages.
 Ritchie et al., "UPnP AV Architecture:1, Version 1.0," Contributing Members of the UPnP Forum, Jun. 25, 2002, 22 pages.
 Ritchie, John, "MediaRenderer:1 Device Template Version 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 12 pages.
 Roland Corporation, "Roland announces BA-55 Portable PA System," press release, Apr. 6, 2011, 2 pages.
 Rothermel et al., "An Adaptive Protocol for Synchronizing Media Streams," Institute of Parallel and Distributed High-Performance Systems (IPVR), 1997, 26 pages.
 Rothermel et al., "An Adaptive Stream Synchronization Protocol," 5th International Workshop on Network and Operating System Support for Digital Audio and Video, 1995, 13 pages.
 Rothermel et al., "An Adaptive Stream Synchronization Protocol," 5th International Workshop on Network and Operating System Support for Digital Audio and Video, Apr. 18-21, 1995, 12 pages.
 Rothermel et al., "Clock Hierarchies—An Abstraction for Grouping and Controlling Media Streams," University of Stuttgart Institute of Parallel and Distributed High-Performance Systems, Jan. 1996, 23 pages.

Rothermel et al., "Synchronization in Joint-Viewing Environments," University of Stuttgart Institute of Parallel and Distributed High-Performance Systems, 1992, 13 pages.
 Rothermel, Kurt, "State-of-the-Art and Future Research in Stream Synchronization," University of Stuttgart, 3 pages.
 "RVL-6 Modular Multi-Room Controller, Installation & Operation Guide," Nile Audio Corporations, 1999, 46 pages.
 Schmandt et al., "Impromptu: Managing Networked Audio Applications for Mobile Users," 2004, 11 pages.
 Schulzrinne et al., "RTP: A Transport Protocol for Real-Time Applications," Network Working Group, RFC: 3550, Standards Track, Jul. 2003, 104 pages.
 Schulzrinne H., et al., "RTP: A Transport Protocol for Real-Time Applications, RFC 3550," Network Working Group, 2003, pp. 1-89.
 Simple Network Time Protocol (SNTP), RFC 1361 (Aug. 1992) (D+M_0397537-46) (10 pages).
 Simple Network Time Protocol (SNTP), RFC 1769 (Mar. 1995) (D+M_0397663-76) (14 pages).
 Simple Service Discovery Protocol/1.0 Operating without an Arbiter (Oct. 28, 1999) (24 pages).
 Sonos Controller for iPad Product Guide; copyright 2004-2013; 47 pages.
 Sonos Digital Music System User Guide, Version: 050801, Aug. 2005, 114 pages.
Sonos, Inc. v. D&M Holdings, D&M Supp Opposition Brief including Exhibits, Mar. 17, 2017, 23 pages.
Sonos, Inc. v. D&M Holdings, Expert Report of Jay P. Kesan including Appendices A-P, Feb. 20, 2017, 776 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Complaint for Patent Infringement, filed Oct. 21, 2014, 20 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions, filed Sep. 14, 2016, 100 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidity Contentions, filed Apr. 15, 2016, 97 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Preliminary Identification of Indefinite Terms, provided Jul. 29, 2016, 8 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' 35 U.S.C. § 282 Notice filed Nov. 2, 2017, 31 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' Amended Answer, Defenses, and Counterclaims for Patent Infringement, filed Nov. 30, 2015, 47 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' Answer to Plaintiff's Second Amended Complaint, filed Apr. 30, 2015, 19 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' First Amended Answer to Plaintiffs' Third Amended Complaint, filed Sep. 7, 2016, 23 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' Reply in Support of Partial Motion for Judgment on the Pleadings, filed Jun. 10, 2016, 15 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' First Amended Answer to Plaintiffs' Third Amended Complaint, provided Aug. 1, 2016, 26 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' Second Amended Answer to Plaintiffs' Third Amended Complaint, filed Sep. 9, 2016, 43 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' Second Amended Answer to Plaintiffs' Third Amended Complaint, provided Sep. 9, 2016, 88 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., First Amended Complaint for Patent Infringement, filed Dec. 17, 2014, 26 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Joint Claim Construction Chart, vol. 1 of 3 with Exhibits A-O, filed Aug. 7, 2016, 30 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Opening Brief in Support of Defendants' Partial Motion for Judgment on the Pleadings for Lack of Patent-Eligible Subject Matter, filed May 6, 2016, 27 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Plaintiff Sonos, Inc.'s Opening Claim Construction Brief, filed Sep. 9, 2016, 26 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Plaintiff Sonos, Inc.'s Response in Opposition to Defendants' Partial Motion for Judgment on the Pleadings, filed May 27, 2016, 24 pages.

US 10,848,885 B2

Page 11

(56)

References Cited

OTHER PUBLICATIONS

Sonos, Inc. v. D&M Holdings Inc. et al., Reply Brief in Support of Defendants' Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Nov. 10, 2016, 16 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Reply Brief in Support of Defendants' Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Sep. 9, 2016, 16 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Second Amended Complaint for Patent Infringement, filed Feb. 27, 2015, 49 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Sonos's Motion to Strike Defendants' New Amended Answer Submitted with their Reply Brief, provided Sep. 15, 2016, 10 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Sonos's Opposition to Defendants' Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Oct. 31, 2016, 26 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Third Amended Complaint for Patent Infringement, filed Jan. 29, 2016, 47 pages.

Sonos, Inc. v. D&M Holdings, Inc. (No. 14-1330-RGA), Defendants' Final Invalidity Contentions (Jan. 18, 2017) (106 pages).

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 226, Opinion Denying Inequitable Conduct Defenses, Feb. 6, 2017, updated, 5 pages.

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 242, US District Judge Andrews 101 Opinion, Mar. 13, 2017, 16 pages.

Notice of Allowance dated Jun. 2, 2014, issued in connection with U.S. Appl. No. 13/083,499, filed Apr. 8, 2011, 5 pages.

Notice of Allowance dated Sep. 3, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 4 pages.

Notice of Allowance dated Aug. 4, 2015, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 13 pages.

Notice of Allowance dated Dec. 5, 2014, issued in connection with U.S. Appl. No. 14/256,434, filed Apr. 18, 2014, 7 pages.

Notice of Allowance dated Oct. 5, 2012, issued in connection with U.S. Appl. No. 13/204,511, filed Aug. 5, 2011, 11 pages.

Notice of Allowance dated Mar. 6, 2014, issued in connection with U.S. Appl. No. 13/827,653, filed Mar. 14, 2013, 17 pages.

Notice of Allowance dated May 6, 2011, issued in connection with U.S. Appl. No. 11/801,468, filed May 9, 2007, 10 pages.

Notice of Allowance dated Sep. 6, 2013, issued in connection with U.S. Appl. No. 13/619,237, filed Sep. 14, 2012, 10 pages.

Notice of Allowance dated Sep. 6, 2016, issued in connection with U.S. Appl. No. 15/134,767, filed Apr. 21, 2016, 7 pages.

Notice of Allowance dated Apr. 7, 2016, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 40 pages.

Notice of Allowance dated Oct. 7, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 7 pages.

Notice of Allowance dated Oct. 9, 2015, issued in connection with U.S. Appl. No. 13/435,739, filed Mar. 30, 2012, 4 pages.

Notice of Allowance dated Sep. 9, 2016, issued in connection with U.S. Appl. No. 15/134,761, filed Apr. 21, 2016, 7 pages.

Notice of Allowance dated Mar. 1, 2018, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 7 pages.

Notice of Allowance dated Aug. 10, 2015, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 9 pages.

Notice of Allowance dated Jul. 10, 2015, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 7 pages.

Notice of Allowance dated Mar. 10, 2016, issued in connection with U.S. Appl. No. 14/937,523, filed Nov. 10, 2015, 5 pages.

Notice of Allowance dated Nov. 10, 2011, issued in connection with U.S. Appl. No. 11/906,702, filed Oct. 2, 2007, 17 pages.

Notice of Allowance dated Sep. 10, 2014, issued in connection with U.S. Appl. No. 13/892,230, filed May 10, 2013, 5 pages.

Notice of Allowance dated Sep. 10, 2018, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 7 pages.

Notice of Allowance dated Apr. 11, 2016, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 21 pages.

Notice of Allowance dated Jan. 11, 2016, issued in connection with U.S. Appl. No. 14/564,544, filed Dec. 9, 2014, 5 pages.

Notice of Allowance dated Jul. 11, 2017, issued in connection with U.S. Appl. No. 14/825,961, filed Aug. 13, 2015, 5 pages.

Notice of Allowance dated Aug. 12, 2015, issued in connection with U.S. Appl. No. 13/435,739, filed Mar. 30, 2012, 27 pages.

Notice of Allowance dated Jun. 12, 2014, issued in connection with U.S. Appl. No. 13/896,829, filed May 17, 2013, 5 pages.

Notice of Allowance dated Jul. 13, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 22 pages.

Notice of Allowance dated May 13, 2015, issued in connection with U.S. Appl. No. 14/299,847, filed Jun. 9, 2014, 10 pages.

Notice of Allowance dated Nov. 13, 2013, issued in connection with U.S. Appl. No. 13/724,048, filed Dec. 21, 2012, 7 pages.

Notice of Allowance dated Nov. 13, 2017, issued in connection with U.S. Appl. No. 14/563,515, filed Dec. 8, 2014, 11 pages.

Notice of Allowance dated Oct. 13, 2015, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 7 pages.

Notice of Allowance dated Jun. 14, 2012, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 9 pages.

Notice of Allowance dated Jan. 15, 2019, issued in connection with U.S. Appl. No. 15/487,686, filed Apr. 14, 2017, 8 pages.

Notice of Allowance dated Jul. 15, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 18 pages.

Notice of Allowance dated Mar. 15, 2016, issued in connection with U.S. Appl. No. 14/937,571, filed Nov. 10, 2015, 5 pages.

Notice of Allowance dated Jun. 16, 2009, issued in connection with U.S. Appl. No. 10/861,653, filed Jun. 5, 2004, 11 pages.

Notice of Allowance dated May 16, 2017, issued in connection with U.S. Appl. No. 15/228,685, filed Aug. 4, 2016, 10 pages.

Notice of Allowance dated Jul. 17, 2015, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 20 pages.

Notice of Allowance dated Aug. 19, 2016, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 9 pages.

Notice of Allowance dated May 19, 2015, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 7 pages.

Notice of Allowance dated Oct. 19, 2016, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 14 pages.

Notice of Allowance dated Jan. 20, 2016, issued in connection with U.S. Appl. No. 14/465,457, filed Aug. 21, 2014, 10 pages.

Notice of Allowance dated Oct. 21, 2015, issued in connection with U.S. Appl. No. 14/174,244, filed Feb. 6, 2014, 5 pages.

Notice of Allowance dated Oct. 21, 2015, issued in connection with U.S. Appl. No. 14/174,253, filed Feb. 6, 2014, 6 pages.

Notice of Allowance dated Sep. 21, 2015, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 11 pages.

Notice of Allowance dated Jan. 22, 2015, issued in connection with U.S. Appl. No. 13/630,565, filed Sep. 28, 2012, 7 pages.

Notice of Allowance dated Sep. 22, 2015, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 7 pages.

Notice of Allowance dated May 24, 2017, issued in connection with U.S. Appl. No. 14/806,070, filed Jul. 22, 2015, 5 pages.

Notice of Allowance dated Oct. 24, 2016, issued in connection with U.S. Appl. No. 15/134,761, filed Apr. 21, 2016, 7 pages.

Notice of Allowance dated Oct. 24, 2016, issued in connection with U.S. Appl. No. 15/134,767, filed Apr. 21, 2016, 7 pages.

Notice of Allowance dated Sep. 24, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 7 pages.

Notice of Allowance dated Sep. 24, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 7 pages.

Notice of Allowance dated Aug. 25, 2017, issued in connection with U.S. Appl. No. 14/505,966, filed Oct. 3, 2014, 5 pages.

Notice of Allowance dated Sep. 25, 2014, issued in connection with U.S. Appl. No. 14/176,808, filed Feb. 10, 2014, 5 pages.

Notice of Allowance dated Aug. 27, 2015, issued in connection with U.S. Appl. No. 13/705,177, filed Dec. 5, 2012, 34 pages.

Notice of Allowance dated Aug. 27, 2015, issued in connection with U.S. Appl. No. 14/505,027, filed Oct. 2, 2014, 18 pages.

Notice of Allowance dated Dec. 27, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 15 pages.

Notice of Allowance dated Oct. 27, 2015, issued in connection with U.S. Appl. No. 14/299,847, filed Jun. 9, 2014, 5 pages.

Notice of Allowance dated Oct. 28, 2014, issued in connection with U.S. Appl. No. 13/896,037, filed May 16, 2013, 7 pages.

Notice of Allowance dated Jul. 29, 2015, issued in connection with U.S. Appl. No. 13/359,976, filed Jan. 27, 2012, 28 pages.

US 10,848,885 B2

Page 12

(56) **References Cited**

OTHER PUBLICATIONS

Notice of Allowance dated Jul. 29, 2015, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 9 pages.

Notice of Allowance dated Aug. 30, 2016, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 7 pages.

Notice of Allowance dated Jul. 30, 2015, issued in connection with U.S. Appl. No. 13/705,178, filed Dec. 5, 2012, 18 pages.

Notice of Allowance dated Aug. 5, 2015, issued in connection with U.S. Appl. No. 13/435,776, filed Mar. 30, 2012, 26 pages.

Notice of Allowance dated Jul. 6, 2015, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 24 pages.

Notice of Allowance dated Apr. 7, 2017, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 8 pages.

Notice of Allowance dated Dec. 7, 2018, issued in connection with U.S. Appl. No. 15/228,812, filed Aug. 4, 2016, 7 pages.

Notice of Incomplete Re-Exam Request dated May 25, 2017, issued in connection with U.S. Appl. No. 90/013,959, filed Apr. 2016, 10 pages.

Notice of Intent to Issue Re-Examination Certificate dated Mar. 24, 2017, issued in connection with U.S. Appl. No. 90/013,859, filed Nov. 4, 2016, 10 pages.

Nutzel et al., "Sharing Systems for Future HiFi Systems," IEEE, 2004, 9 pages.

Office Action in Ex Parte Reexamination mailed on Oct. 20, 2017, issued in connection with Reexamination U.S. Appl. No. 90/013,959, filed Jun. 16, 2017, 50 pages.

Palm, Inc., "Handbook for the Palm VII Handheld," May 2000, 311 pages.

Parasound Zpre2 Zone Preamplifier with PTZI Remote Control, 2005, 16 pages.

Park et al., "Group Synchronization in MultiCast Media Communications," Proceedings of the 5th Research on Multicast Technology Workshop, 2003, 5 pages.

Pillai et al., "A Method to Improve the Robustness of MPEG Video Applications over Wireless Networks," Kent Ridge Digital Labs, 2000, 15 pages.

Polycom Conference Composer User Guide, copyright 2001, 29 pages.

Postel, J., "User Datagram Protocol," RFC: 768, USC/Information Sciences Institute, Aug. 1980, 3 pages.

Preinterview First Office Action dated Jun. 8, 2016, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 4 pages.

Pre-Interview First Office Action dated Mar. 10, 2015, issued in connection with U.S. Appl. No. 14/505,027, filed Oct. 2, 2014, 4 pages.

Presentations at WinHEC 2000, May 2000, 138 pages.

PRISMIQ, Inc., "PRISMIQ Media Player User Guide," 2003, 44 pages.

Proficient Audio Systems M6 Quick Start Guide, 2011, 5 pages.

Proficient Audio Systems: Proficient Editor Advanced Programming Guide, 2007, 40 pages.

Programming Interface for WL54040 Dual-Band Wireless Transceiver, AVAG00066, Agere Systems, May 2004, 16 pages.

Radio Shack, "Auto-Sensing 4-Way Audio/Video Selector Switch," 2004, 1 page.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 1, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 2, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 3, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 4, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 5, 46 pages.

Rane: DragNet software; available for sale at least 2006.

Rangan et al., "Feedback Techniques for Continuity and Synchronization in Multimedia Information Retrieval," ACM Transactions on Information Systems, 1995, pp. 145-176, vol. 13, No. 2.

Real Time Control Protocol (RTCP) and Realtime Transfer Protocol (RTP), RFC 1889 (Jan. 1996) (D+M_0397810-84) (75 pages).

Realtime Streaming Protocol (RTSP), RFC 2326 (Apr. 1998) (D+M_0397945-8036) (92 pages).

Realtime Transport Protocol (RTP), RFC 3550 (Jul. 2003) (D+M_0398235-323) (89 pages).

Re-Exam Final Office Action dated Aug. 5, 2015, issued in connection with U.S. Appl. No. 90/013,423, filed Jan. 5, 2015, 25 pages.

Reexam Non-Final Office Action dated Oct. 17, 2016, issued in connection with U.S. Appl. No. 90/013,756, filed May 25, 2016, 31 pages.

Re-Exam Non-Final Office Action dated Apr. 22, 2015, issued in connection with U.S. Appl. No. 90/013,423, filed Jan. 5, 2015, 16 pages.

Reid, Mark, "Multimedia conferencing over ISDN and IP networks using ITU-T H-series recommendations: architecture, control and coordination," Computer Networks, 1999, pp. 225-235, vol. 31.

RenderingControl:1 Service Template Version 1.01 for UPnP, Version 1.0, (Jun. 25, 2002) (SONDM000115187-249) (63 pages).

Renewed Request for Ex Parte Re-Examination, U.S. Appl. No. 90/013,959 filed Jun. 16, 2017, 126 pages.

Final Office Action dated Mar. 27, 2014, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 29 pages.

Final Office Action dated Jan. 28, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 21 pages.

Final Office Action dated Jun. 30, 2008, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 30 pages.

Final Office Action dated Jul. 1, 2016, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 11 pages.

Final Office Action dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 11 pages.

Final Office Action dated Aug. 3, 2015, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 13 pages.

Final Office Action dated Dec. 3, 2014, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 12 pages.

Final Office Action dated Jul. 3, 2012, issued in connection with U.S. Appl. No. 13/298,090, filed Nov. 16, 2011, 46 pages.

Final Office Action dated Jun. 3, 2016, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 24 pages.

Final Office Action dated Mar. 3, 2015, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 13 pages.

Final Office Action dated Mar. 4, 2015, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 16 pages.

Final Office Action dated Mar. 5, 2015, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 13 pages.

Final Office Action dated Jan. 7, 2015, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 14 pages.

Final Office Action dated Mar. 9, 2015, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 14 pages.

Final Office Action dated Aug. 10, 2015, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 26 pages.

Final Office Action dated Feb. 10, 2014, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 13 pages.

Final Office Action dated Aug. 11, 2015, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 15 pages.

Final Office Action dated Feb. 11, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 13 pages.

Final Office Action dated Feb. 11, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 17 pages.

Final Office Action dated Feb. 12, 2015, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 20 pages.

Final Office Action dated Apr. 13, 2017, issued in connection with U.S. Appl. No. 14/563,515, filed Dec. 8, 2014, 13 pages.

Final Office Action dated Dec. 13, 2016, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 14 pages.

Final Office Action dated Oct. 13, 2011, issued in connection with U.S. Appl. No. 11/853,790, filed Sep. 11, 2007, 10 pages.

Final Office Action dated Oct. 13, 2011, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 10 pages.

Final Office Action dated Nov. 14, 2018, issued in connection with U.S. Appl. No. 15/130,919, filed Apr. 15, 2016, 12 pages.

Final Office Action dated Jul. 15, 2015, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 18 pages.

Final Office Action dated Jun. 15, 2015, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 25 pages.

US 10,848,885 B2

Page 13

(56)

References Cited

OTHER PUBLICATIONS

Final Office Action dated Dec. 17, 2014, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 36 pages.

Final Office Action dated Oct. 19, 2016, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 14 pages.

Final Office Action dated Jan. 21, 2010, issued in connection with U.S. Appl. No. 11/906,702, filed Oct. 2, 2007, 27 pages.

Final Office Action dated Oct. 22, 2014, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 12 pages.

Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 23 pages.

Final Office Action dated Feb. 24, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 28 pages.

Final Office Action dated May 25, 2016, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 33 pages.

Final Office Action dated Apr. 28, 2015, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2013, 20 pages.

Final Office Action dated Jun. 29, 2015, issued in connection with U.S. Appl. No. 14/465,457, filed Aug. 21, 2014, 13 pages.

Final Office Action dated Jan. 3, 2019, issued in connection with U.S. Appl. No. 15/405,931, filed Jan. 13, 2017, 16 pages.

Final Office Action dated Nov. 30, 2015, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 26 pages.

Final Office Action dated Apr. 6, 2015, issued in connection with U.S. Appl. No. 14/620,937, filed Feb. 12, 2015, 15 pages.

Final Office Action dated Dec. 7, 2017, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 11 pages.

Fireball DVD and Music Manager DVDM-100 Installation and User's Guide, Copyright 2003, 185 pages.

Fireball MP-200 User's Manual, Copyright 2006, 93 pages.

Fireball Remote Control Guide WD006-1-1, Copyright 2003, 19 pages.

Fireball SE-D1 User's Manual, Copyright 2005, 90 pages.

First Action Interview Office Action Summary dated Apr. 15, 2015, issued in connection with U.S. Appl. No. 14/505,027, filed Oct. 2, 2014, 6 pages.

Fober et al., "Clock Skew Compensation over a High Latency Network," Proceedings of the ICMC, 2002, pp. 548-552.

Fries et al., "The MP3 and Internet Audio Handbook: Your Guide to the Digital Music Revolution," 2000, 320 pages.

Fulton et al., "The Network Audio System: Make Your Application Sing (as Well as Dance)!" The X Resource, 1994, 14 pages.

Gaston et al., "Methods for Sharing Stereo and Multichannel Recordings Among Planetariums," Audio Engineering Society Convention Paper 7474, 2008, 15 pages.

General Event Notification Architecture Base: Client to Arbiter (Apr. 2000) (23 pages).

Sony: BD/DVD Home Theatre System Operating Instructions for BDV-IT1000/BDV-IS1000, Copyright 2008, 159 pages.

Sony: Blu-ray Disc/DVD Home Theatre System Operating Instructions for BDV-IZ1000W, Copyright 2010, 88 pages.

Sony: DVD Home Theatre System Operating Instructions for DAV-DZ380W/DZ680W/DZ880W, Copyright 2009, 136 pages.

Sony: DVD Home Theatre System Operating Instructions for DAV-DZ870W, Copyright 2008, 128 pages.

Sony Ericsson MS500 User Guide, Copyright 2009, 2 pages.

Sony: Home Theatre System Operating Instructions for HT-IS100, Copyright 2008, 168 pages.

Sony: HT-IS100, 5.1 Channel Audio System, last updated Nov. 2009, 2 pages.

Sony: Multi Channel AV Receiver Operating Instructions, 2007, 80 pages.

Sony: Multi Channel AV Receiver Operating Instructions for STR-DN1000, Copyright 2009, 136 pages.

Sony: STR-DN1000, Audio Video Receiver, last updated Aug. 2009, 2 pages.

Sony: Wireless Surround Kit Operating Instructions for WHAT-SA2, Copyright 2010, 56 pages.

Taylor, Marilou, "Long Island Sound," Audio Video Interiors, Apr. 2000, 8 pages.

Third Party Request for Ex Parte Re-Examination, U.S. Appl. No. 90/013,859, filed Nov. 4, 2016, 424 pages.

TOA Corporation, Digital Processor DP-0206 DACsys2000 Version 2.00 Software Instruction Manual, Copyright 2001, 67 pages.

Understanding Universal Plug and Play, Microsoft White Paper (Jun. 2000) (D+M_0402074-118) (45 pages).

U.S. Appl. No. 60/490,768, filed Jul. 28, 2003, entitled "Method for synchronizing audio playback between multiple networked devices," 13 pages.

U.S. Appl. No. 60/825,407, filed Sep. 12, 2006, entitled "Controlling and manipulating groupings in a multi-zone music or media system," 82 pages.

Universal Plug and Play Device Architecture V. 1.0, (Jun. 8, 2000) (54 pages).

Universal Plug and Play in Windows XP, Tom Fout. Microsoft Corporation (Jul. 2001) (D+M_0402041-73) (33 pages).

Universal Plug and Play ("UPnP") AV Architecture:1 for UPnP, Version 1.0, (Jun. 25, 2002) (D+M_0298151-72) (22 pages).

Universal Plug and Play Vendor's Implementation Guide (Jan. 5, 2000) (7 pages).

UPnP AV Architecture:0.83 (Jun. 12, 2002) (SONDM000115483-504) (22 pages).

UPnP Design by Example, A Software Developers Guide to Universal Plug and Play Michael Jeronimo and Jack West, Intel Press (D+M_0401307-818) (Apr. 2003) (511 pages).

UPnP: "Universal Plug and Play Device Architecture," Jun. 8, 2000; version 1.0; Microsoft Corporation; pp. 1-54.

U.S. Appl. No. 13/083,499, filed Apr. 8, 2011, "Multi-Channel Pairing in a Media System."

WANCommonInterfaceConfig:1 Service Template Version 1.01 for UPnP, Ver. 1.0 (Nov. 12, 2001) (D+M_0401820-43) (24 pages).

WANIPConnection:1 Service Template Version 1.01 for UPnP Ver. 1.0 (Nov. 12, 2001) (D+M_0401844-917) (74 pages).

WANPPPConnection:1 Service Template Version 1.01 for UPnP, Version 1.0 (Nov. 12, 2001) (D+M_0401918-2006) (89 pages).

WaveLan High-Speed Multimode Chip Set, AVAGO0003, Agere Systems, Feb. 2003, 4 pages.

WaveLan High-Speed Multimode Chip Set, AVAGO0005, Agere Systems, Feb. 2003, 4 pages.

WaveLAN Wireless Integration Developer Kit (WI-DK) for Access Point Developers, AVAGO0054, Agere Systems, Jul. 2003, 2 pages.

WaveLAN Wireless Integration-Developer Kit (WI-DK) Hardware Control Function (HCF), AVAGO0052, Agere Systems, Jul. 2003, 2 pages.

"Welcome. You're watching Apple TV." Apple TV 1st Generation Setup Guide, Apr. 8, 2008 Retrieved Oct. 14, 2014, 40 pages.

"Welcome. You're watching Apple TV." Apple TV 2nd Generation Setup Guide, Mar. 10, 2011 Retrieved Oct. 16, 2014, 36 pages.

"Welcome. You're watching Apple TV." Apple TV 3rd Generation Setup Guide, Mar. 16, 2012 Retrieved Oct. 16, 2014, 36 pages.

WI-DK Release 2 WaveLan Embedded Drivers for VxWorks and Linux, AVAGO0056, Agere Systems, Jul. 2003, 2 pages.

WI-DK Release 2 WaveLan END Reference Driver for VxWorks, AVAGO0044, Agere Systems, Jul. 2003, 4 pages.

WI-DK Release 2 WaveLan LKM Reference Drivers for Linux, AVAGO0048, Agere Systems, Jul. 2003, 4 pages.

Windows Media Connect Device Compatibility Specification (Apr. 12, 2004) (16 pages).

WPA Reauthentication Rates, AVAGO0063, Agere Systems, Feb. 2004, 3 pages.

Yamaha DME 32 manual: copyright 2001.

Yamaha DME 64 Owner's Manual; copyright 2004, 80 pages.

Yamaha DME Designer 3.5 setup manual guide; copyright 2004, 16 pages.

Yamaha DME Designer 3.5 User Manual; Copyright 2004, 507 pages.

Yamaha DME Designer software manual: Copyright 2004, 482 pages.

"Symantec pcAnywhere User's Guide," v 10.5.1, 1995-2002, 154 pages.

"Systemline Modular Installation Guide, Multiroom System," Systemline, 2003, pp. 1-22.

US 10,848,885 B2

Page 14

(56) References Cited

OTHER PUBLICATIONS

“ZR-8630AV MultiZone AudioNideo Receiver, Installation and Operation Guide,” Niles Audio Corporation, 2003, 86 pages.

ZX135: Installation Manual, LA Audio, Apr. 2003, 44 pages.

Sonos, Inc. v. D&M Holdings, Sonos Supp Opening Markman Brief including Exhibits, Mar. 3, 2017, 17 pages.

Sonos, Inc. v. D&M Holdings, Sonos Supp Reply Markman Brief including Exhibits, Mar. 29, 2017, 36 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Declaration of Steven C. Visser, executed Sep. 9, 2016, 40 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Amended Invalidity Contentions Exhibit 1: Defendants’ Invalidity Contentions for U.S. Pat. No. 7,571,014 filed Sep. 16, 2016, 270 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Amended Invalidity Contentions Exhibit 10: Defendants’ Invalidity Contentions for U.S. Pat. No. 9,219,959 filed Sep. 27, 2016, 236 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Amended Invalidity Contentions Exhibit 11: Defendants’ Invalidity Contentions for Design U.S. Pat. No. D. 559,197 filed Sep. 27, 2016, 52 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Amended Invalidity Contentions Exhibit 2: Defendants’ Invalidity Contentions for U.S. Pat. No. 8,588,949 filed Sep. 27, 2016, 224 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Amended Invalidity Contentions Exhibit 3: Defendants’ Invalidity Contentions for U.S. Pat. No. 8,843,224 filed Sep. 27, 2016, 147 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Amended Invalidity Contentions Exhibit 4: Defendants’ Invalidity Contentions for U.S. Pat. No. 8,938,312 filed Sep. 27, 2016, 229 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Amended Invalidity Contentions Exhibit 5: Defendants’ Invalidity Contentions for U.S. Pat. No. 8,938,637 filed Sep. 27, 2016, 213 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Amended Invalidity Contentions Exhibit 6: Defendants’ Invalidity Contentions for U.S. Pat. No. 9,042,556 filed Sep. 27, 2016, 162 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Amended Invalidity Contentions Exhibit 7: Defendants’ Invalidity Contentions for U.S. Pat. No. 9,195,258 filed Sep. 27, 2016, 418 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Amended Invalidity Contentions Exhibit 9: Defendants’ Invalidity Contentions for U.S. Pat. No. 9,213,357 filed Sep. 27, 2016, 251 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Initial Invalidity Contentions Exhibit 1: Defendants’ Invalidity Contentions for U.S. Pat. No. 7,571,014 filed Apr. 15, 2016, 161 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Initial Invalidity Contentions Exhibit 10: Defendants’ Invalidity Contentions for U.S. Pat. No. 9,213,357 filed Apr. 15, 2016, 244 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Initial Invalidity Contentions Exhibit 11: Defendants’ Invalidity Contentions for U.S. Pat. No. 9,219,959 filed Apr. 15, 2016, 172 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Initial Invalidity Contentions Exhibit 12: Defendants’ Invalidity Contentions for Design U.S. Pat. No. D. 559,197 filed Apr. 15, 2016, 36 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Initial Invalidity Contentions Exhibit 2: Defendants’ Invalidity Contentions for U.S. Pat. No. 8,588,949 filed Apr. 15, 2016, 112 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Initial Invalidity Contentions Exhibit 3: Defendants’ Invalidity Contentions for U.S. Pat. No. 8,843,224 filed Apr. 15, 2016, 118 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Initial Invalidity Contentions Exhibit 4: Defendants’ Invalidity Contentions for U.S. Pat. No. 8,938,312 filed Apr. 15, 2016, 217 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Initial Invalidity Contentions Exhibit 5: Defendants’ Invalidity Contentions for U.S. Pat. No. 8,938,637 filed Apr. 15, 2016, 177 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Initial Invalidity Contentions Exhibit 6: Defendants’ Invalidity Contentions for U.S. Pat. No. 9,042,556 filed Apr. 15, 2016, 86 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Initial Invalidity Contentions Exhibit 7: Defendants’ Invalidity Contentions for U.S. Pat. No. 9,130,771 filed Apr. 15, 2016, 203 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Initial Invalidity Contentions Exhibit 8: Defendants’ Invalidity Contentions for U.S. Pat. No. 9,195,258 filed Apr. 15, 2016, 400 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Initial Invalidity Contentions Exhibit 9: Defendants’ Invalidity Contentions for U.S. Pat. No. 9,202,509 filed Apr. 15, 2016, 163 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant’s Preliminary Identification of Prior Art References, provided Jul. 29, 2016, 5 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants’ Brief in Support of their Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Oct. 12, 2016, 24 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants’ Opposition to Sonos’s Motion to Strike Defendants’ New Amended Answer Submitted with their Reply, provided Oct. 3, 2016, 15 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants’ Second Amended Answer to Plaintiffs’ Third Amended Complaint, provided Oct. 12, 2016, 43 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit B: Defendants’ Second Amended Answer to Plaintiffs’ Third Amended Complaint, provided Oct. 12, 2016, 43 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Opening Brief in Support of Defendants’ Motion for Leave to Amend Their Answer to Add the Defense of Inequitable Conduct, provided Aug. 1, 2016, 11 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Order, provided Oct. 7, 2016, 2 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Plaintiff’s Opposition to Defendants’ Motion for Leave to Amend Their Answer to Add the Defense of Inequitable Conduct, provided Aug. 26, 2016, 25 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Redlined Exhibit B: Defendants’ First Amended Answer to Plaintiffs’ Third Amended Complaint, provided Aug. 1, 2016, 27 pages.

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 206-1, Transcript of 101 Hearing (Nov. 28, 2016) (28 pages).

Sonos, Inc. v. D&M Holdings (No. 14-330-RGA), DI 207, Public Joint Claim Construction Brief (Nov. 30, 2016) (88 pages).

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 214, D&M Post-Markman Letter (Dec. 22, 2016) (13 pages).

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 215, Sonos Post-Markman Letter (Dec. 22, 2016) (15 pages).

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 219, Claim Construction Opinion (Jan. 12, 2017) (24 pages).

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 221, Claim Construction Order (Jan. 18, 2017) (2 pages).

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), Markman Hearing Transcript (Dec. 14, 2016) (69 pages).

Sonos Multi-Room Music System User Guide, Version: 091001, 2009, 299 pages.

Sonos Play:3 Product Guide; copyright 2004-2011; 2 pages.

Sonos Play:3 Product Guide; copyright 2004-2012; 14 pages.

Sonos Play:3 Product Guide; copyright 2004-2013; 15 pages.

Sonos Play:3 Teardown; <https://www.ifixit.com/Teardown/Sonos+Play%3A3+Teardown/12475>; 11 pages.

Sony: AIR-SA 50R Wireless Speaker, Copyright 2009, 2 pages.

Sony: Altus Quick Setup Guide ALT-SA32PC, Copyright 2009, 2 pages.

Sony: BD/DVD Home Theatre System Operating Instructions for BDV-E300, E301 and E801, Copyright 2009, 115 pages.

“884+ Automatic Matrix Mixer Control System,” Ivie Technologies, Inc., 2000, pp. 1-4.

Advanced Driver Tab User Interface WaveLan GUI Guide, AVAGO0009, Agere Systems, Feb. 2004, 4 pages.

Advisory Action dated Feb. 2, 2016, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 2, 2013, 8 pages.

US 10,848,885 B2

Page 15

(56)

References Cited

OTHER PUBLICATIONS

Advisory Action dated Sep. 18, 2008, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 8 pages.

Advisory Action dated Feb. 1, 2016, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 6 pages.

Advisory Action dated Jun. 1, 2015, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 11 pages.

Advisory Action dated Mar. 2, 2015, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 3 pages.

Advisory Action dated Jan. 5, 2012, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 3 pages.

Advisory Action dated Oct. 5, 2015, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 4 pages.

Advisory Action dated Sep. 5, 2014, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 3 pages.

Advisory Action dated Oct. 6, 2016, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 4 pages.

Advisory Action dated Jan. 8, 2015, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 4 pages.

Advisory Action dated Jun. 9, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 25, 2013, 3 pages.

Advisory Action dated Feb. 10, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 3 pages.

Advisory Action dated Nov. 12, 2014, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 6 pages.

Advisory Action dated Apr. 15, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 9 pages.

Advisory Action dated Apr. 15, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 9 pages.

Advisory Action dated Dec. 22, 2011, issued in connection with U.S. Appl. No. 11/853,790, filed Sep. 11, 2007, 2 pages.

Advisory Action dated Mar. 25, 2015, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 5 pages.

Advisory Action dated Feb. 26, 2015, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 3 pages.

Advisory Action dated Nov. 26, 2014, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 9 pages.

Advisory Action dated Jul. 28, 2015, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 7 pages.

Advisory Action dated Sep. 28, 2009, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 4 pages.

Agere Systems' Voice-over-Wireless LAN (VoWLAN) Station Quality of Service, AVAGO0015, Agere Systems, Jan. 2005, 5 pages.

Akyildiz et al., "Multimedia Group Synchronization Protocols for Integrated Services Networks," IEEE Journal on Selected Areas in Communications, 1996 pp. 162-173, vol. 14, No. 1.

Anonymous, "Information technology—Generic coding of moving pictures and associated audio information—Part Audio," ISO/IEC 13818-3, Apr. 1998, pp. 11.

Anonymous, "Transmission Control Protocol," RFC: 793, USC/Information Sciences Institute, Sep. 1981, 91 pages.

Audio Authority: How to Install and Use the Model 1154 Signal Sensing Auto Selector, 2002, 4 pages.

Audio Authority: Model 1154B High Definition AV Auto Selector, 2008, 8 pages.

AudioSource: AMP 100 User Manual, 2003, 4 pages.

AudioTron Quick Start Guide, Version 1.0, Mar. 2001, 24 pages.

AudioTron Reference Manual, Version 3.0, May 2002, 70 pages.

AudioTron Setup Guide, Version 3.0, May 2002, 38 pages.

Automatic Profile Hunting Functional Description, AVAGO0013, Agere Systems, Feb. 2004, 2 pages.

"A/S Surround Receiver AVR-5800," Denon Electronics, 2000, 2 pages.

"A/S System Controlee, Owner's Manual," B&K Components, Ltd., 1998, 52 pages.

AVTransport:1 Service Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (66 pages).

AXIS Communication: AXIS P8221 Network I/O Audio Module, 2009, 41 pages.

Baldwin, Roberto. "How-To: Setup iTunes Dj on Your Max and iPhone", available at http://www.maclife.com/article/howtos/howto_setup_itunes_dj_your_mac_andiphone, archived on Mar. 17, 2009, 4 pages.

Balfanz et al., "Network-in-a-Box: How to Set Up a Secure Wireless Network in Under a Minute," 13th USENIX Security Symposium—Technical Paper, 2002, 23 pages.

Balfanz et al., "Talking to Strangers: Authentication in Ad-Hoc Wireless Networks," Xerox Palo Alto Research Center, 2002, 13 pages.

Barham et al., "Wide Area Audio Synchronisation," University of Cambridge Computer Laboratory, 1995, 5 pages.

Baudisch et al., "Flat Volume Control: Improving Usability by Hiding the Volume Control Hierarchy in the User Interface," 2004, 8 pages.

Benslimane Abderrahim, "A Multimedia Synchronization Protocol for Multicast Groups," Proceedings of the 26th Euromicro Conference, 2000, pp. 456-463, vol. 1.

Biersack et al., "Intra- and Inter-Stream Synchronization for Stored Multimedia Streams," IEEE International Conference on Multimedia Computing and Systems, 1996, pp. 372-381.

Blakowski G. et al., "A Media Synchronization Survey: Reference Model, Specification, and Case Studies," Jan. 1996, pp. 5-35, vol. 14, No. 1.

Bluetooth. "Specification of the Bluetooth System: The ad hoc SCATTERNET for affordable and highly functional wireless connectivity," Core, Version 1.0 A, Jul. 26, 1999, 1068 pages.

Bluetooth. "Specification of the Bluetooth System: Wireless connections made easy," Core, Version 1.0 B, Dec. 1, 1999, 1076 pages.

Bogen Communications, Inc., ProMatrix Digitally Matrixed Amplifier Model PM3180, Copyright 1996, 2 pages.

Brassil et al., "Enhancing Internet Streaming Media with Cueing Protocols," 2000, 9 pages.

LG: RJP-201M Remote Jack Pack Installation and Setup Guide, 2010, 24 pages.

Lienhart et al., "On the Importance of Exact Synchronization for Distributed Audio Signal Processing," Session L: Poster Session II—ICASSP'03 Papers, 2002, 1 page.

LinkSys by Cisco, Wireless Home Audio Controller, Wireless-N Touchscreen Remote DMRW1000 Datasheet, Copyright 2008, 2 pages.

LinkSys by Cisco, Wireless Home Audio Controller, Wireless-N Touchscreen Remote DMRW1000 User Guide, Copyright 2008, 64 pages.

LinkSys by Cisco, Wireless Home Audio Player, Wireless-N Music Extender DMP100 Quick Installation Guide, Copyright 2009, 32 pages.

LinkSys by Cisco, Wireless Home Audio Player, Wireless-N Music Extender DMP100 User Guide, Copyright 2008, 65 pages.

Linux SDK for UPnP Devices v. 1.2 (Sep. 6, 2002) (101 pages).

Liu et al., "A synchronization control scheme for real-time streaming multimedia applications," Packet Video, 2003, 10 pages, vol. 2003.

Liu et al., "Adaptive Delay Concealment for Internet Voice Applications with Packet-Based Time-Scale Modification," Information Technologies 2000, pp. 91-102.

Louderback, Jim, "Affordable Audio Receiver Furnishes Homes With MP3," TechTV Vault. Jun. 28, 2000 retrieved Jul. 10, 2014, 2 pages.

Machine Translation of JP2004-193868A Wireless Transmission and Reception System and Wireless Transmission and Reception Method, 2 pages.

Machine Translation of JP2007-2888405A Video Sound Output System, Video Sound Processing Method, and Program, 64 pages.

Maniactools, "Identify Duplicate Files by Sound," Sep. 28, 2010, <http://www.maniactools.com/soft/music-duplicate-remover/identify-duplicate-files-by-sound.shtml>.

MediaRenderer:1 Device Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (12 pages).

MediaServer:1 Device Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (12 pages).

Microsoft, Universal Plug and Play (UPnP) Client Support ("Microsoft UPnP") (Aug. 2001) (D+M_0402007-24) (18 pages).

US 10,848,885 B2

Page 16

(56)

References Cited

OTHER PUBLICATIONS

Microsoft Window's XP Reviewer's Guide (Aug. 2001) (D+M_0402225-85) (61 pages).

"Microsoft Windows XP File and Printer Share with Microsoft Windows" Microsoft Windows XP Technical Article, 2003, 65 pages.

Mills David L., "Network Time Protocol (Version 3) Specification, Implementation and Analysis," Network Working Group, Mar. 1992, 7 pages.

Mills, David L., "Precision Synchronization of Computer Network Clocks," ACM SIGCOMM Computer Communication Review, 1994, pp. 28-43, vol. 24, No. 2.

"Model MRC44 Four Zone—Four Source Audio/Video Controller/Amplifier System," Xantech Corporation, 2002, 52 pages.

Motorola, "Simplefi, Wireless Digital Audio Receiver, Installation and User Guide," Dec. 31, 2001, 111 pages.

"SMPTE Made Simple: A Time Code Tutor by Timeline," 1996, 46 pages.

Network Time Protocol (NTP), RFC 1305 (Mar. 1992) (D+M_0397417-536) (120 pages).

"NexSys Software v.3 Manual," Crest Audio, Inc., 1997, 76 pages.

Niederst, Jennifer "O'Reilly Web Design in a Nutshell," Second Edition, Sep. 2001, 678 pages.

Nilsson, M., "ID3 Tag Version 2," Mar. 26, 1998, 28 pages.

Non-Final Office Action dated May 1, 2014, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 31 pages.

Non-Final Office Action dated Dec. 5, 2013, issued in connection with U.S. Appl. No. 13/827,653, filed Mar. 14, 2013, 28 pages.

Non-Final Office Action dated Jan. 5, 2012, issued in connection with U.S. Appl. No. 13/298,090, filed Nov. 16, 2011, 40 pages.

Non-Final Office Action dated May 6, 2014, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 23 pages.

Non-Final Office Action dated Jan. 7, 2014, issued in connection with U.S. Appl. No. 13/896,829, filed May 17, 2013, 11 pages.

Non-Final Office Action dated Sep. 7, 2016, issued in connection with U.S. Appl. No. 13/864,248, filed Apr. 17, 2013, 12 pages.

Non-final Office Action dated Apr. 10, 2013, issued in connection with U.S. Appl. No. 13/619,237, filed Sep. 14, 2012, 10 pages.

Non-Final Office Action dated Feb. 10, 2014, issued in connection with U.S. Appl. No. 13/083,499, filed Apr. 8, 2011, 12 pages.

Non-Final Office Action dated May 12, 2014, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 23 pages.

Non-Final Office Action dated May 14, 2014, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 14 pages.

Non-Final Office Action dated Jun. 17, 2014, issued in connection with U.S. Appl. No. 14/176,808, filed Feb. 10, 2014, 6 pages.

Non-Final Office Action dated Dec. 18, 2013, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 12 pages.

Non-Final Office Action dated Jan. 18, 2008, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 38 pages.

Non-Final Office Action dated Apr. 19, 2010, issued in connection with U.S. Appl. No. 11/801,468, filed May 9, 2007, 16 pages.

Non-Final Office Action dated Mar. 19, 2013, issued in connection with U.S. Appl. No. 13/724,048, filed Dec. 21, 2012, 9 pages.

Non-Final Office Action dated Jun. 21, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 13 pages.

Non-Final Office Action dated Jan. 22, 2009, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 18 pages.

Non-Final Office Action dated Jul. 23, 2014, issued in connection with U.S. Appl. No. 14/256,434, filed Apr. 18, 2014, 12 pages.

Non-Final Office Action dated Jul. 25, 2014, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 9 pages.

Non-Final Office Action dated Jul. 25, 2014, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 11 pages.

Non-Final Office Action dated Jun. 25, 2010, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 17 pages.

Non-Final Office Action dated Nov. 25, 2013, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 19 pages.

Non-Final Office Action dated May 27, 2014, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 13 pages.

Non-Final Office Action dated Aug. 20, 2009, issued in connection with U.S. Appl. No. 11/906,702, filed Oct. 2, 2007, 27 pages.

Non-Final Office Action dated Oct. 20, 2016, issued in connection with U.S. Appl. No. 14/563,515, filed Dec. 8, 2014, 10 pages.

Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/080,591, filed Mar. 25, 2016, 9 pages.

Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/080,716, filed Mar. 25, 2016, 8 pages.

Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/088,283, filed Apr. 1, 2016, 9 pages.

Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/088,532, filed Apr. 1, 2016, 9 pages.

Non-Final Office Action dated Aug. 22, 2018, issued in connection with U.S. Appl. No. 15/487,686, filed Apr. 14, 2017, 13 pages.

Non-Final Office Action dated Dec. 22, 2014, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 11 pages.

Non-Final Office Action dated Sep. 22, 2016, issued in connection with U.S. Appl. No. 15/088,906, filed Apr. 1, 2016, 9 pages.

Non-Final Office Action dated Sep. 22, 2016, issued in connection with U.S. Appl. No. 15/155,149, filed May 16, 2016, 7 pages.

Non-Final Office Action dated Jun. 23, 2015, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 30 pages.

Non-Final Office Action dated Mar. 23, 2015, issued in connection with U.S. Appl. No. 14/299,847, filed Jun. 9, 2014, 14 pages.

Non-Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 11 pages.

Non-Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 11 pages.

Non-Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 9 pages.

Non-Final Office Action dated Sep. 23, 2014, issued in connection with U.S. Appl. No. 13/630,565, filed Sep. 28, 2012, 7 pages.

Non-Final Office Action dated Feb. 24, 2017, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 9 pages.

Non-Final Office Action dated May 24, 2016, issued in connection with U.S. Appl. No. 15/134,767, filed Apr. 21, 2016, 12 pages.

Non-final Office Action dated Oct. 24, 2014, issued in connection with U.S. Appl. No. 13/435,776, filed Mar. 30, 2012, 14 pages.

Non-Final Office Action dated Apr. 25, 2018, issued in connection with U.S. Appl. No. 15/130,919, filed Apr. 15, 2016, 13 pages.

Non-Final Office Action dated Feb. 26, 2015, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 25 pages.

Non-Final Office Action dated Mar. 26, 2015, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 18 pages.

Non-Final Office Action dated Jan. 27, 2015, issued in connection with U.S. Appl. No. 14/465,457, filed Aug. 21, 2014, 11 pages.

Non-Final Office Action dated Jun. 27, 2008, issued in connection with U.S. Appl. No. 10/861,653, filed Jun. 5, 2004, 19 pages.

Non-Final Office Action dated Mar. 27, 2015, issued in connection with U.S. Appl. No. 13/705,178, filed Dec. 5, 2012, 14 pages.

Non-Final Office Action dated Sep. 27, 2013, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 12 pages.

Non-Final Office Action dated Sep. 27, 2016, issued in connection with U.S. Appl. No. 15/228,685, filed Aug. 4, 2016, 8 pages.

Non-Final Office Action dated Dec. 28, 2015, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 29 pages.

Non-Final Office Action dated Dec. 28, 2016, issued in connection with U.S. Appl. No. 15/343,000, filed Nov. 3, 2016, 11 pages.

Non-Final Office Action dated Jan. 29, 2016, issued in connection with U.S. Appl. No. 14/937,523, filed Nov. 10, 2015, 10 pages.

Non-Final Office Action dated Jun. 29, 2016, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 12 pages.

Non-Final Office Action dated Apr. 30, 2012, issued in connection with U.S. Appl. No. 13/204,511, filed Aug. 5, 2011, 16 pages.

Non-Final Office Action dated Jan. 30, 2015, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 29 pages.

Non-Final Office Action dated Jan. 30, 2015, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 13 pages.

Non-Final Office Action dated Nov. 30, 2016, issued in connection with U.S. Appl. No. 15/243,186, filed Aug. 22, 2016, 12 pages.

Non-Final Office Action dated Oct. 30, 2018, issued in connection with U.S. Appl. No. 16/128,443, filed Sep. 11, 2018, 21 pages.

US 10,848,885 B2

Page 17

(56) **References Cited**

OTHER PUBLICATIONS

Non-Final Office Action dated Sep. 30, 2016, issued in connection with U.S. Appl. No. 13/864,249, filed Apr. 17, 2013, 12 pages.
Non-Final Office Action dated Oct. 31, 2016, issued in connection with U.S. Appl. No. 14/806,070, filed Jul. 22, 2015, 11 pages.
North American MPEG-2 Information, "The MPEG-2 Transport Stream," Retrieved from the Internet: URL: <http://www.coolstf.com/mpeg/#ts>, 2006, pp. 1-5.

Notice of Allowability dated Apr. 18, 2013, issued in connection with U.S. Appl. No. 11/853,790, filed Sep. 11, 2007, 4 pages.

Notice of Allowance dated Jan. 31, 2013, issued in connection with U.S. Appl. No. 13/298,090, filed Nov. 16, 2011, 19 pages.

Notice of Allowance dated Dec. 1, 2016, issued in connection with U.S. Appl. No. 15/088,283, filed Apr. 1, 2016, 9 pages.

Notice of Allowance dated Jun. 1, 2017, issued in connection with U.S. Appl. No. 14/808,397, filed Jul. 24, 2015, 5 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/088,532, filed Apr. 1, 2016, 9 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/088,678, filed Apr. 1, 2016, 9 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/089,758, filed Apr. 4, 2016, 9 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/155,149, filed May 16, 2016, 9 pages.

Notice of Allowance dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 17 pages.

Notice of Allowance dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 19 pages.

Notice of Allowance dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 23 pages.

Breebaart et al., "Multi-Channel Goes Mobile: MPEG Surround Binaural Rendering," AES 29th International Conference, Sep. 2-4, 2006, pp. 1-13.

Bretl W.E., et al., MPEG2 Tutorial [online], 2000 [retrieved on Jan. 13, 2009] Retrieved from the Internet(<http://www.bretl.com/mpeghtml/MPEGIndex.htm>), pp. 1-23.

Buerk et al., "AVTransport:1 Service Template Version 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 67 pages.
Canadian Intellectual Property Office, Canadian Office Action dated Apr. 4, 2016, issued in connection with Canadian Patent Application No. 2,842,342, 5 pages.

Canadian Intellectual Property Office, Canadian Office Action dated Sep. 14, 2015, issued in connection with Canadian Patent Application No. 2,842,342, 2 pages.

Canadian Patent Office, Canadian Office Action dated Aug. 30, 2017, issued in connection with CA Application No. 2947275, 5 pages.

Canadian Patent Office, Office Action dated Apr. 10, 2015, issued in connection with Canadian Patent Application No. 2,832,542, 3 pages.

Cen et al., "A Distributed Real-Time MPEG Video Audio Player," Department of Computer Science and Engineering, Oregon Graduate Institute of Science and Technology, 1995, 12 pages.

Chakrabarti et al., "A Remotely Controlled Bluetooth Enabled Environment," IEEE, 2004, pp. 77-81.

Change Notification: Agere Systems WaveLan Multimode Reference Design (D2 to D3), AVAGO0042, Agere Systems, Nov. 2004, 2 pages.

Chinese Patent Office, First Office Action dated Oct. 12, 2018, issued in connection with Chinese Application No. 201610804134.8, 10 pages.

Chinese Patent Office, Office Action dated Jul. 5, 2016, issued in connection with Chinese Patent Application No. 201380044380.2, 25 pages.

Chinese Patent Office, Office Action dated Nov. 27, 2015, issued in connection with Chinese Patent Application No. 201280028038.9, 26 pages.

Connection Manager: 1 Service Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (25 pages).

ContentDirectory:1 Service Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (89 pages).

Corrected Notice of Allowance dated Mar. 12, 2015, issued in connection with U.S. Appl. No. 13/630,565, filed Sep. 28, 2012, 4 pages.

Corrected Notice of Allowance dated Aug. 19, 2015, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 2 pages.

Corrected Notice of Allowance dated Oct. 30, 2015, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 2 pages.

Corrected Notice of Allowance dated Dec. 6, 2017, issued in connection with U.S. Appl. No. 15/228,685, filed Aug. 4, 2016, 5 pages.

Creative, "Connecting Bluetooth Devices with Creative D200," <http://support.creative.com/kb/ShowArticle.aspx?url=http://ask.creative.com:80/SRVS/CGI-BIN/WEB/CGI.EXE/./?St=106,E=000000000396859016,K=9377,Sxi=8,VASET=ws:http://us.creative.com,case=63350>, available on Nov. 28, 2011, 2 pages.

Crown PIP Manual available for sale at least 2004, 68 pages.

Dannenberg et al., "A. System Supporting Flexible Distributed Real-Time Music Processing," Proceedings of the 2001 International Computer Music Conference, 2001, 4 pages.

Dannenberg, Roger B., "Remote Access to Interactive Media," Proceedings of the SPIE 1785, 1993, pp. 230-237.

Day, Rebecca, "Going Elan!" Primedia Inc., 2003, 4 pages.

Deep-Sleep Implementation in WL60011 for IEEE 802.11b Applications, AVAGO0020, Agere Systems, Jul. 2004, 22 pages.

Dell, Inc. "Dell Digital Audio Receiver: Reference Guide," Jun. 2000, 70 pages.

Dell, Inc. "Start Here," Jun. 2000, 2 pages.

"Denon 2003-2004 Product Catalog," Denon, 2003-2004, 44 pages.

Denon AV Surround Receiver AVR-1604/684 User's Manual, 2004, 128 pages.

Denon AV Surround Receiver AVR-5800 Operating Instructions, Copyright 2000, 67 pages.

Designing a UPnP AV MediaServer, Nelson Kidd (2003) (SONDM000115062-116) (55 pages).

Dorwaldt, Carl, "EASE 4.1 Tutorial," Renkus-Heinz, Inc., 2004, 417 pages.

"DP-0206 Digital Signal Processor," TOA Electronics, Inc., 2001, pp. 1-12.

Dynaudio Acoustics Air Series, <http://www.soundonsound.com/sos/sep02/articles/dynaudioair.asp>, 2002, 4 pages.

European Patent Office, European Extended Search Report dated Mar. 7, 2016, issued in connection with EP Application No. 13810340.3, 9 pages.

European Patent Office, European Extended Search Report dated Feb. 28, 2014, issued in connection with EP Application No. 13184747.7, 8 pages.

European Patent Office, European Extended Search Report dated Mar. 31, 2015, issued in connection with EP Application No. 14181454.1, 9 pages.

European Patent Office, European Search Report dated Jul. 5, 2016, issued in connection with European Patent Application No. 16156935.5, 9 pages.

European Patent Office, Examination Report dated Mar. 22, 2016, issued in connection with European Patent Application No. EP14181454.1, 6 pages.

European Patent Office, Examination Report dated Oct. 24, 2016, issued in connection with European Patent Application No. 13808623.6, 4 pages.

European Patent Office, Extended European Search Report dated Jul. 5, 2016, issued in connection with European Patent Application No. 16156940.5, 7 pages.

Falcone, John, "Sonos BU150 Digital Music System review," CNET, CNET [online] Jul. 27, 2009 [retrieved on Mar. 16, 2016], 11 pages Retrieved from the Internet: URL:<http://www.cnet.com/products/sonos-bu150-digital-music-system/>.

Faller, Christof, "Coding of Spatial Audio Compatible with Different Playback Formats," Audio Engineering Society Convention Paper (Presented at the 117th Convention), Oct. 28-31, 2004, 12 pages.

US 10,848,885 B2

Page 18

(56) References Cited

OTHER PUBLICATIONS

File History of Re-Examination U.S. Appl. No. 90/013,423.
 Final Office Action dated Jun. 5, 2014, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 12 pages.
 Final Office Action dated Jul. 13, 2009, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 16 pages.
 Final Office Action dated Sep. 13, 2012, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 17 pages.
 Final Office Action dated Nov. 18, 2015, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 56 pages.
 Final Office Action dated Oct. 21, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 19 pages.
 Final Office Action dated Jul. 23, 2014, issued in connection with U.S. Appl. No. 13/896,037, filed May 16, 2013, 12 pages.
 Hans et al., "Interacting with Audio Streams for Entertainment and Communication," Proceedings of the Eleventh ACM International Conference on Multimedia, ACM, 2003, 7 pages.
 Herre et al., "The Reference Model Architecture for MPEG Spatial Audio Coding," Audio Engineering Society Convention Paper (Presented at the 118th Convention), May 28-31, 2005, 13 pages.
 Home Networking with Universal Plug and Play, IEEE Communications Magazine, vol. 39 No. 12 (Dec. 2001) (D+M_0402025-40) (16 pages).
 "Home Theater Control Systems," Cinema Source, 2002, 19 pages.
 Horwitz, Jeremy, "Logic3 i-Station25," retrieved from the internet: <http://www.ilounge.com/index.php/reviews/entry/logic3-i-station25/>, last visited Dec. 17, 2013, 5 pages.
 Huang C.M., et al., "A Synchronization Infrastructure for Multicast Multimedia at the Presentation Layer," IEEE Transactions on Consumer Electronics, 1997, pp. 370-380, vol. 43, No. 3.
 IBM Home Director Installation and Service Manual, Copyright 1998, 124 pages.
 IBM Home Director Owner's Manual, Copyright 1999, 67 pages.
 ID3 tag version 2.4.0—Native Frames, Draft Specification, copyright 2000, 41 pages.
Implicit, LLC v. Sonos, Inc. (No. 14-1330-RGA), Defendant's Original Complaint (Mar. 3, 2017) (15 pages).
 Integra Audio Network Receiver NAC 2.3 Instruction Manual, 68 pages.
 Integra Audio Network Server NAS 2.3 Instruction Manual, pp. 1-32.
 Integra Service Manual, Audio Network Receiver Model NAC-2.3, Dec. 2002, 44 pages.
 Intel Designing a UPnP AV Media Renderer, v. 1.0 ("Intel AV Media Renderer") (May 20, 2003) (SONDM000115117-62) (46 pages).
 Intel Media Renderer Device Interface ("Intel Media Renderer") (Sep. 6, 2002) (62 pages).
 Intel SDK for UPnP Devices Programming Guide, Version 1.2.1, (Nov. 2002) (30 pages).
 International Bureau, International Preliminary Report on Patentability dated Jan. 8, 2015, issued in connection with International Application No. PCT/US2013/046372, filed on Jun. 18, 2013, 6 pages.
 International Bureau, International Preliminary Report on Patentability, dated Jan. 8, 2015, issued in connection with International Application No. PCT/US2013/046386, filed on Jun. 18, 2013, 8 pages.
 International Bureau, International Preliminary Report on Patentability, dated Oct. 17, 2013, issued in connection with International Application No. PCT/IB2012/052071, filed on Apr. 26, 2012, 7 pages.
 International Bureau, International Preliminary Report on Patentability dated Jan. 30, 2014, issued in connection with International Application No. PCT/US2012/045894, filed on Jul. 9, 2012, 6 pages.
 International Searching Authority, International Search Report dated Aug. 1, 2008, in connection with International Application No. PCT/US2004/023102, 5 pages.

International Searching Authority, International Search Report dated Aug. 23, 2012, issued in connection with International Application No. PCT/IB2012/052071, filed on Apr. 26, 2012, 3 pages.
 International Searching Authority, International Search Report dated Aug. 26, 2013, issued in connection with International Application No. PCT/US2013/046372, filed on Jun. 18, 2013, 3 pages.
 International Searching Authority, International Search Report dated Dec. 26, 2012, issued in connection with International Application No. PCT/US2012/045894, filed on Jul. 9, 2012, 3 pages.
 International Searching Authority, International Search Report dated Sep. 30, 2013, issued in connection with International Application No. PCT/US2013/046386, filed on Jun. 18, 2013, 3 pages.
 International Searching Authority, Written Opinion dated Aug. 23, 2012, issued in connection with International Application No. PCT/IB2012/052071, filed on Apr. 26, 2012, 6 pages.
 International Searching Authority, Written Opinion dated Aug. 26, 2013, issued in connection with International Application No. PCT/US2013/046372, filed on Jun. 18, 2013, 4 pages.
 International Searching Authority, Written Opinion dated Dec. 26, 2012, issued in connection with International Application No. PCT/US2012/045894, filed on Jul. 9, 2012, 4 pages.
 International Searching Authority, Written Opinion dated Sep. 30, 2013, issued in connection with International Application No. PCT/US2013/046386, filed on Jun. 18, 2013, 6 pages.
 Ishibashi et al., "A Comparison of Media Synchronization Quality Among Reactive Control Schemes," IEEE Infocom, 2001, pp. 77-84.
 Ishibashi et al., "A Group Synchronization Mechanism for Live Media in Multicast Communications," IEEE Global Telecommunications Conference, 1997, pp. 746-752, vol. 2.
 Ishibashi et al., "A Group Synchronization Mechanism for Stored Media in Multicast Communications," IEEE Information Revolution and Communications, 1997, pp. 692-700, vol. 2.
 Issues with Mixed IEEE 802.b/802.11g Networks, AVAGO0058, Agere Systems, Feb. 2004, 5 pages.
 Japanese Patent Office, Decision of Rejection dated Jul. 8, 2014, issued in connection with Japanese Patent Application No. 2012-178711, 3 pages.
 Japanese Patent Office, Notice of Rejection, dated Feb. 3, 2015, issued in connection with Japanese Patent Application No. 2014-521648, 7 pages.
 Japanese Patent Office, Notice of Rejection dated Sep. 15, 2015, issued in connection with Japanese Patent Application No. 2014-220704, 7 pages.
 Japanese Patent Office, Office Action dated Nov. 1, 2016, issued in connection with Japanese Application No. 2015-238682, 7 pages.
 Japanese Patent Office, Office Action dated Jan. 6, 2015, issued in connection with Japanese Patent Application No. 2014-503273, 5 pages.
 Japanese Patent Office, Office Action dated Dec. 18, 2018, issued in connection with Japanese Application No. 2017-211958, 8 pages.
 Japanese Patent Office, Office Action dated May 24, 2016, issued in connection with Japanese Patent Application No. 2014-220704, 7 pages.
 Japanese Patent Office, Office Action dated Mar. 29, 2016, issued in connection with Japanese Patent Application No. JP2015-520288, 12 pages.
 Japanese Patent Office, Office Action Summary dated Feb. 2, 2016, issued in connection with Japanese Patent Application No. 2015-520286, 6 pages.
 Japanese Patent Office, Office Action Summary dated Sep. 8, 2015, issued in connection with Japanese Patent Application No. 2014-503273, 4 pages.
 Japanese Patent Office, Office Action Summary dated Nov. 19, 2013, issued in connection with Japanese Patent Application No. 2012-178711, 5 pages.
 Japanese Patent Office, Translation of Office Action dated Dec. 18, 2018, issued in connection with Japanese Application No. 2017-211958, 6 pages.
 Jo et al., "Synchronized One-to-many Media Streaming with Adaptive Playout Control," Proceedings of SPIE, 2002, pp. 71-82, vol. 4861.

US 10,848,885 B2

Page 19

(56)

References Cited

OTHER PUBLICATIONS

Jones, Stephen, "Dell Digital Audio Receiver: Digital upgrade for your analog stereo," Analog Stereo, Jun. 24, 2000 retrieved Jun. 18, 2014, 2 pages.

Kou et al., "RenderingControl:1 Service Template Verion 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 63 pages.
Lake Processors: Lake® LM Series Digital Audio Processors Operation Manual, 2011, 71 pages.

Levergood et al., "AudioFile: A Network-Transparent System for Distributed Audio Applications," Digital Equipment Corporation, 1993, 109 pages.

Non-Final Office Action dated Feb. 29, 2012, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 10 pages.

Non-Final Office Action dated Nov. 29, 2010, issued in connection with U.S. Appl. No. 11/801,468, filed May 9, 2007, 17 pages.

Non-Final Office Action dated Jul. 30, 2013 issued in connection with U.S. Appl. No. 13/724,048, filed Dec. 21, 2012, 7 pages.

Non-Final Office Action dated Jul. 31, 2014, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 31 pages.

Non-Final Office Action dated Dec. 1, 2014, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 11 pages.

Non-Final Office Action dated Jun. 1, 2016, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 21 pages.

Non-Final Office Action dated Jan. 3, 2017, issued in connection with U.S. Appl. No. 14/808,397, filed Jul. 2015, 11 pages.

Non-Final Office Action dated Jun. 3, 2015, issued in connection with U.S. Appl. No. 14/564,544, filed Dec. 9, 2014, 7 pages.

Non-Final Office Action dated Nov. 3, 2016, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 17 pages.

Non-Final Office Action dated Jan. 4, 2017, issued in connection with U.S. Appl. No. 14/825,961, filed Aug. 13, 2015, 11 pages.

Non-Final Office Action dated Jun. 4, 2015, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 16 pages.

Non-Final Office Action dated Mar. 4, 2015, issued in connection with U.S. Appl. No. 13/435,776, filed Mar. 30, 2012, 16 pages.

Non-Final Office Action dated Oct. 4, 2016, issued in connection with U.S. Appl. No. 15/089,758, filed Apr. 4, 2016, 9 pages.

Non-Final Office Action dated Oct. 5, 2016, issued in connection with U.S. Appl. No. 13/864,250, filed Apr. 17, 2013, 10 pages.

Non-Final Office Action dated Oct. 5, 2016, issued in connection with U.S. Appl. No. 13/864,252, filed Apr. 17, 2013, 11 pages.

Non-Final Office Action dated Oct. 6, 2016, issued in connection with U.S. Appl. No. 15/088,678, filed Apr. 1, 2016, 9 pages.

Non-Final Office Action dated Jul. 7, 2015, issued in connection with U.S. Appl. No. 14/174,244, filed Feb. 6, 2014, 9 pages.

Non-Final Office Action dated Oct. 7, 2016, issued in connection with U.S. Appl. No. 15/156,392, filed May 17, 2016, 8 pages.

Non-Final Office Action dated Mar. 8, 2011, issued in connection with U.S. Appl. No. 11/853,790, filed Sep. 11, 2007, 10 pages.

Non-Final Office Action dated Mar. 8, 2016, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 13 pages.

Non-Final Office Action dated Aug. 9, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 31 pages.

Non-Final Office Action dated May 9, 2014, issued in connection with U.S. Appl. No. 13/892,230, filed May 10, 2013, 10 pages.

Non-Final Office Action dated Nov. 1, 2018, issued in connection with U.S. Appl. No. 16/129,758, filed Sep. 12, 2018, 23 pages.

Non-Final Office Action dated Feb. 10, 2016, issued in connection with U.S. Appl. No. 14/937,571, filed Nov. 10, 2015, 9 pages.

Non-Final Office Action dated Mar. 10, 2011, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 12 pages.

Non-Final Office Action dated May 10, 2016, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 22 pages.

Non-Final Office Action dated Nov. 10, 2016, issued in connection with U.S. Appl. No. 15/243,355, filed Aug. 22, 2016, 11 pages.

Non-Final Office Action dated Jun. 11, 2018, issued in connection with U.S. Appl. No. 15/405,931, filed Jan. 13, 2017, 14 pages.

Non-Final Office Action dated Dec. 12, 2016, issued in connection with U.S. Appl. No. 15/343,019, filed Nov. 3, 2016, 8 pages.

Non-Final Office Action dated Jun. 12, 2015, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 16 pages.

Non-Final Office Action dated Mar. 12, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 13 pages.

Non-Final Office Action dated Oct. 12, 2016, issued in connection with U.S. Appl. No. 14/505,966, filed Oct. 3, 2014, 10 pages.

Non-Final Office Action dated Feb. 13, 2014, issued in connection with U.S. Appl. No. 13/896,037, filed May 16, 2013, 10 pages.

Non-Final Office Action dated Feb. 13, 2015, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 14 pages.

Non-Final Office Action dated Jan. 13, 2016, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 14 pages.

Non-Final Office Action dated Jun. 13, 2016, issued in connection with U.S. Appl. No. 14/620,937, filed Feb. 12, 2015, 12 pages.

Non-Final Office Action dated Jun. 13, 2016, issued in connection with U.S. Appl. No. 15/134,761, filed Apr. 21, 2016, 10 pages.

Non-Final Office Action dated Mar. 13, 2015, issued in connection with U.S. Appl. No. 13/705,177, filed Dec. 5, 2012, 15 pages.

Non-Final Office Action dated May 14, 2018, issued in connection with U.S. Appl. No. 15/228,812, filed Aug. 4, 2016, 15 pages.

Non-Final Office Action dated Dec. 15, 2016, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 12 pages.

Non-Final Office Action dated Jul. 15, 2015, issued in connection with U.S. Appl. No. 14/174,253, filed Feb. 6, 2014, 9 pages.

Non-Final Office Action dated Nov. 16, 2016, issued in connection with U.S. Appl. No. 15/228,639, filed Aug. 4, 2016, 15 pages.

Non-Final Office Action dated Dec. 17, 2015, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 10 pages.

Non-Final Office Action dated Nov. 17, 2014, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 11 pages.

Non-Final Office Action dated Nov. 17, 2016, issued in connection with U.S. Appl. No. 14/620,937, filed Feb. 12, 2015, 14 pages.

Non-Final Office Action dated Feb. 18, 2009, issued in connection with U.S. Appl. No. 10/861,653, filed Jun. 5, 2004, 18 pages.

Non-Final Office Action dated Nov. 18, 2014, issued in connection with U.S. Appl. No. 13/435,739, filed Mar. 30, 2012, 10 pages.

Non-Final Office Action dated Jan. 19, 2018, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 14 pages.

Non-Final Office Action dated Jun. 19, 2015, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 38 pages.

Non-Final Office Action dated Nov. 19, 2014, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 9 pages.

AuviTran AVB32-ES User's Manual, 2005, 25 pages.

AuviTran AVKIT-ES for AD8HR User's Manual, 2005, 15 pages.

Chinese Patent Office, Second Office Action and Translation dated Jun. 27, 2019, issued in connection with Chinese Application No. 201610804134.8, 15 pages.

Chinese Patent Office, Translation of Office Action dated Jun. 27, 2019, issued in connection with Chinese Application No. 201610804134.8, 10 pages.

CobraNet Manager, Direct control over your audio network. www.peakaudio.com/CobraNet/FAQ.html, 2005 [retrieved online Jul. 12, 2019 at web.archive.org/web/20050403214230/http://www.peakaudio.com/CobraNet/FAQ/] 13 pages.

Japanese Patent Office, Final Office Action dated Jun. 4, 2019, issued in connection with Japanese Patent Application No. 2017-211958, 8 pages.

Japanese Patent Office, Translation of Final Office Action dated Jun. 4, 2019, issued in connection with Japanese Patent Application No. 2017-211958, 5 pages.

Non-Final Office Action dated Jul. 17, 2019, issued in connection with U.S. Appl. No. 15/130,919, filed Apr. 15, 2016, 15 pages.

Non-Final Office Action dated Aug. 28, 2019, issued in connection with U.S. Appl. No. 16/422,160, filed May 24, 2019, 14 pages.

Non-Final Office Action dated Jul. 5, 2019, issued in connection with U.S. Appl. No. 16/383,565, filed Apr. 12, 2019, 11 pages.

Notice of Allowance dated Jun. 10, 2019, issued in connection with U.S. Appl. No. 16/128,443, filed Sep. 11, 2018, 10 pages.

Notice of Allowance dated May 30, 2019, issued in connection with U.S. Appl. No. 16/129,758, filed Sep. 12, 2018, 7 pages.

Notice of Allowance dated Nov. 4, 2019, issued in connection with U.S. Appl. No. 16/422,160, filed May 24, 2019, 13 pages.

US 10,848,885 B2

Page 20

(56)

References Cited

OTHER PUBLICATIONS

Notice of Allowance dated Sep. 5, 2019, issued in connection with U.S. Appl. No. 16/383,565, filed Apr. 12, 2019, 14 pages.

NewsRoom. Business Wire, Good Guys Unveils Top 10 Holiday Electronics Gifts; Advances in Technology and Lower Prices Across the Industry Make for Great Deals on In-Demand Products This Season, Dec. 3, 2003, 3 pages.

NewsRoom. Bytestechnology Briefing, Feb. 19, 2002, 2 pages.

NewsRoom. CEA Announces 2007 Mark of Excellence Award Winners, Mar. 10, 2007, 3 pages.

NewsRoom. CEDIA Abuzz with Trends—Integrators agree: The hot products at this year's expo are the start of a revolutionary move for the home automation market. Oct. 9, 2006, 4 pages.

NewsRoom. Chicago Sun Times, Wireless stream player hits the right notes, Jan. 17, 2004, 3 pages.

NewsRoom. Computer Shopper, Entertainment geekly: the blueprints have been drawn for a connected home that fuses the PC with entertainment devices. All you have to do is install . . . , Nov. 1, 2003, 6 pages.

NewsRoom. Computer Shopper, Tunes all around, vol. 23; Issue 11, Nov. 1, 2003, 1 page.

NewsRoom. Computer Shopper, What we want: here's the gear our editors are wishing for this year, vol. 23; Issue 12, Dec. 1, 2003, 8 pages.

NewsRoom. Computer Shopper, Wi-Fi meets Hi-Fi: here's how to stream music, still images, and videos to your home entertainment center, Nov. 1, 2003, 5 pages.

NewsRoom. Custom Home, Easy listening: the hard disk is shaping the future of home entertainment. (The Wired House), May 1, 2003, 3 pages.

NewsRoom. D-Link to Supply Omnifi with Exclusive New Antenna for Streaming Audio Throughout the House, Jan. 8, 2004, 3 pages.

NewsRoom. Easdown, R., System Heaven: Custom House Technofile, Nov. 24, 2003, 5 pages.

NewsRoom. Electronic House Expo Announces 2005 Multi-Room Audio/Video Award Winners. Nov. 18, 2005, 3 pages.

NewsRoom. Electronic House Expo Fall 2003 Exhibitor Profiles. Business Wire. Nov. 11, 2003, 7 pages.

NewsRoom. Electronic House Expo Spring 2004 Exhibitor Profiles. Business Wire. Mar. 10, 2004, 7 pages.

NewsRoom. Evangelista, B., Sound and Fury the Latest in Volume and Video at SF Home Entertainment Show, Jun. 6, 2003, 3 pages.

NewsRoom. Fallon et al. The Goods, Jul. 31, 2003, 2 pages.

NewsRoom. Future shocks—Connect: Your ultimate home-entertainment guide, Dec. 4, 2003, 3 pages.

NewsRoom. Greg, T., Rooms with a tune, Jul. 23, 2003, 3 pages.

NewsRoom. Hoffman, A., Computer networks start entertaining, Jun. 1, 2003, 3 pages.

NewsRoom. Home theater systems that are a real blast, New Straits. Jan. 6, 2000, 3 pages.

NewsRoom. IDG's PC World Announces Winners of the 2004 World Class Awards, Jun. 2, 2004, 3 pages.

NewsRoom. InfoComm 2004 Exhibitors vol. 7, Issue 5, May 1, 2004, 24 pages.

NewsRoom. International Herald Tribune, Transmitting media gets easier cheaply, Jan. 31, 2004, 2 pages.

NewsRoom. Latest electronic gadgets unveiled in Las Vegas: Wireless Devices take centre stage, Jan. 13, 2003, 4 pages.

NewsRoom. Linksys Extends Wireless Functionality to the Television, Jul. 14, 2003, 3 pages.

NewsRoom. Linksys Ships Wireless-B Media Link for Streamlined Delivery of Music From PC to Stereo Stream MP3s, Play Lists and Internet Radio to Any Stereo With the Wireless-B Media Link for Music, May 19, 2004, 3 pages.

NewsRoom. Linksys Wireless Home Products Are Hot Tech Gifts for 2003, Nov. 24, 2003, 3 pages.

NewsRoom. Living room expansion—The PC is going from word processor to entertainment hub for many households, Aug. 18, 2003, 4 pages.

NewsRoom. Macy's Returns to Electronics With Home Theater Boutique, Aug. 11, 2003, 2 pages.

NewsRoom. Many different ways to enjoy digital music library, Apr. 29, 2003, 3 pages.

NewsRoom. Marlowe, C., Pad gadgets: home is where the gear is. Oct. 20, 2003, 2 pages.

NewsRoom. Miller II, S. A., Technology gets simpler and smarter, Jan. 14, 2003, 2 pages.

NewsRoom. Miller, M., Adapted for flight: hands-on trial: wireless media adapters send digital entertainment soaring from PC to living room. Sep. 18, 2003, 3 pages.

NewsRoom. Miller, S., Creating Virtual Jukeboxes Gadgets Make Digital Music Portable. Aug. 19, 2003, 3 pages.

NewsRoom. Morning Call, Cutting the cord; Wi-Fi networks connect computers, TVs, DVD players and more without a clutter of wires, Feb. 2, 2003, 5 pages.

NewsRoom. Mossberg, W., PC-stored music sent without wires, Jan. 25, 2004, 2 pages.

NewsRoom. Nadel, B., Beam music, images from PC to stereo, TV: Linksys Wireless-B Media Adapter WMA11B. Nov. 1, 2003, 2 pages.

NewsRoom. Net Briefs, Jul. 21, 2003, 2 pages.

NewsRoom. NetWork World, The Toys of Summer, Sep. 1, 2003, 3 pages.

NewsRoom. Networked C300 Speaks Your Language. Apr. 6, 2003, 3 pages.

NewsRoom. New Camera—Now What? It's easy to go wild printing, sharing your digital photos. Oct. 16, 2003, 2 pages.

NewsRoom. New Products Allow Easier Access to Audio Video on Home Computers, Nov. 9, 2003, 3 pages.

NewsRoom. Newman, H., All-in-one Audio, Video Devices will be next big thing, Jan. 9, 2003, 3 pages.

NewsRoom. Norris, A., Come over to my house. Jan. 23, 2003, 3 pages.

NewsRoom. On the Printer Trail—Ream of new SMB models offers channel a range of sales hooks CRN Test Center finds. Oct. 13, 2003, 5 pages.

NewsRoom. One way to organize and weed Favorites, May 8, 2003, 3 pages.

NewsRoom. Outfitting your personal fortress of solitude, Mar. 14, 2002, 4 pages.

NewsRoom. Philadelphia Inquirer, Wireless solution for stereo sound, Aug. 7, 2003, 3 pages.

NewsRoom. Popular Science, Yamaha Musiccast an easy way to spread music around your home, Dec. 1, 2003, 2 pages.

Acoustic Research. 900MHz Wireless Stereo Speakers Model AW871 Installation and Operation Manual, 2003, 15 pages.

Acoustic Research. 900MHz Wireless Stereo Speakers Model AW871 Installation and Operation Manual, 2007, 12 pages.

Acoustic Research. Wireless Stereo Speakers with Auto-Tuning. Model AW877 Installation and Operation Manual, 2007, 13 pages.

Amazon.com: CD30 c300 Wireless Network MP3 Player (Analog/Digital): Home Audio & Theater, 5 pages. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

Amazon.com, Cisco-Linksys Wireless-B Music System WML511B, 5 pages. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

Amazon.com. Creative Labs Sound Blaster Wireless Music: Electronics, 7 pages, [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

Apple. Airport Express, Setup Guide. May 20, 2004, 51 pages.

Apple. Airport Express, Setup Guide. 2004, 48 pages.

Apple Developer Connection. Browsing for Network Services. Nov. 12, 2002, 5 pages.

Apple. NewsRoom, Apple "Open Sources" Rendezvous. Sep. 25, 2002, 2 pages.

Apple. NewsRoom, Apple Ships New AirPort Express with iTunes Jul. 14, 2004, 3 pages.

Apple. NewsRoom, Apple Unveils AirPort Express for Mac & PC Users. Jun. 7, 2004, 3 pages.

Apple. NewsRoom, Developers Rapidly Adopt Apple's Rendezvous Networking Technology, Sep. 10, 2002, 3 pages.

US 10,848,885 B2

Page 21

(56)

References Cited

OTHER PUBLICATIONS

Apple WWDC 2003 Session 105—Rendezvous—YouTube available via <https://www.youtube.com/watch?v=Ge5bsDijGWM> [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

Audio Authority. Access EZ: Demonstration Network. Home Audio and Video System Installation Manual, 60 pages. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

Beatty et al. Web Services Dynamic Discovery WS-Discovery, Feb. 2004, 35 pages.

Blau, John. News Analysis, Wi-Fi Hotspot Networks Sprout Like Mushrooms, Sep. 2002, 3 pages.

Bluetooth Specification. Advanced Audio Distribution Profile (A2DP) Specification, 2007, 73 pages.

BoomBottle MM Blue Hatch 2-Pack. Blue Hatch Waterproof Dual Pairing Wireless Speakers each with Built-in-MagicMount, 4 pages. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

Bootcamp. Digital Music on Your Stereo System. Jan. 10, 2003, 1 page.

Bose Lifestyle SA-2 and SA-3 Stereo Amplifier Owner's Guide, 2004, 32 pages.

Bose. The Bose Lifestyle Powered Speaker System. Owner's Guide. Dec. 20, 2001, 19 pages.

BridgeCo—Wireless Loudspeaker Product Information Version 1.4, 16 Dec. 2003, 5 pages.

BridgeCo. BridgeCo Launches UPnP-Compliant Wireless Audio Adapter: Moving More Digital Audio to More Devices in More Locations, Wirelessly. Sep. 16, 2003, 1 page.

BridgeCo. Company Overview. 1 page [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Networked Loudspeaker Product Information, 4 pages. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Professional Loudspeaker—Product Information, 3 pages. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. User Manual, Wireless Audio Adapter. Sep. 22, 2003, 34 pages.

BridgeCo. Vision. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Vision, 5 Factors, 5 Missing Functionalities. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Vision, 5 Key Functions. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Vision, BridgeCo Solution. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Vision, Consumer Benefits. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Vision, Consumer Demand. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Vision, ENA Applications. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Vision, ENA Deployment. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Vision, ENA Functionality. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Vision, ENA Market. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Vision, Entertainment Continuum. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Vision, Entertainment Network Adapter. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Vision, New Entertainment. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Vision, Technical Problems. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

BridgeCo. Wireless Audio Adapter, Product Information. 3 pages. [produced by Google in Inv. No. 337-TA-1191 on May 5, 2020].

BridgeCo. Wireless Audio Adapter Reference Design, Product Information. Version 1.3. Oct. 31, 2003, 2 pages.

BridgeCo. Wireless Loudspeaker, Product Information. 4 pages. [produced by Google in Inv. No. 337-TA-1191 on May 5, 2020].

BridgeCo. Wireless Loudspeaker, Product Information. Version 1.4. Dec. 16, 2003, 5 pages.

Buffalo. Link Theater LT-H90 Media Player v1.0, 2003-2008, 38 pages.

Buffalo. LinkTheater PC-P3LWG/DVD, 59 pages. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

Business Wire. BridgeCo Adds Wireless Connectivity and Enhances Surround Sound Processing for New Generation Speakers. May 5, 2003, 2 pages.

c200 Wireless Network MP3 Player, Jun. 4, 2003, 1 page.

Creative Sound Blaster Wireless Music, User's Guide, Version 1.0, Aug. 2003, 61 pages.

Creston's Adagio Entertainment System with New AMS Processor Wins Awards at CEDIA, Sep. 29, 2006, 3 pages.

Creston Adagio AMS Media System Operations Guide, 2008, 114 pages.

Creston. Adagio. Home Entertainment is Just the Beginning . . . 2007, 10 pages.

Creston. AVS Forum. Dec. 1, 2007, 9 pages.

Creston, Industry Awards, Creston's Spirit of Innovation has Resulted in the Most Award-Winning Products in the Industry, 2006, 6 pages.

Creston, Industry Awards, Creston's Spirit of Innovation has Resulted in the Most Award-Winning Products in the Industry, 2007, 5 pages.

Crome, Caleb. Logitech Squeezebox Boom Audio Design, 2008, 11 pages.

Dhir, Amit, "Wireless Home Networks—DECT, Bluetooth, Home RF, and Wirelss LANs," XILINX, wp135 (v1.0), Mar. 21, 2001, 18 pages.

Dierks et al. RFC 2246 The TLS Protocol, Jan. 1999, 80 pages.

D-Link. User's Manual, Wireless HD Media Player, Version 1.1, DSM-520, Sep. 28, 2005, 127 pages.

DLNA. Overview and Vision, White Paper, Jun. 2004, 16 pages.

DLNA. Use Case Scenarios, White Paper, Jun. 2004, 15 pages.

Duo Soundolier. Sound & Light: Wireless Speaker Torchiere. Soundolier Integrated Wireless Technologies, 2006, 3 pages.

ECMA. Near Field Communication—White Paper, Ecma/TC32-TG19/2004/1, 9 pages. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

ECMA. Near Field Communication, Ecma/TC32-TG19, Oct. 2002, 15 pages.

ECMA. Standard ECMA-340, Near Field Communication—Interface and Protocol NFCIP-1, Dec. 2002, 66 pages.

Ecma. What is Ecma? 2 pages. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

Epson. EpsonNet 802.11B, Convenient Printing Using Wireless Technology, 2002, 2 pages.

Epson. EpsonNet 802.11b, User's Guide, 2002, 68 pages.

Epson Product Support Bulletin. PSB # PSB.2003.05.005, Epson-Net 802.11b Wireless Print Server, Apr. 30, 2003, 30 pages.

Epson Product Support Bulletin. PSB # PSB.2003.05.007, Epson-Net 802.11b Wireless Print Server, Apr. 23, 2003, 10 pages.

Epson Stylus C80WN. Quick Start, 2002, 2 pages.

Epson Stylus C80WN. Setup and Installation, Nov. 2001, 67 pages.

Extron System Integrator Speakers. System Integrator Speaker Series. ExtronNews. Issue 16.2, Winter 2005, 32 pages.

Ez-Stream 11 Mbps Wireless Audio Adapter. Model No. SMCWAA-B. Home Entertainment Networking, 2 pages [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

Fielding et al. RFC 2616 Hypertext Transfer Protocol—HTTP/1.1, Jun. 1999, 114 pages.

First Action Pre-Interview Office Action dated Jun. 22, 2017, issued in connection with U.S. Appl. No. 14/516,883, filed Oct. 17, 2014, 4 pages.

First Office Action Interview dated Aug. 30, 2017, issued in connection with U.S. Appl. No. 14/516,883, filed Oct. 17, 2014, 5 pages.

Fried, John J. NewsRoom, Convergence melds personal computer, TV and stereo, Feb. 20, 2003, 4 pages.

Frodigh, Magnus. Wireless ad hoc networking—The art of networking without a network, Ericsson Review No. 4, 2000, 16 pages.

(56)

References Cited

OTHER PUBLICATIONS

Gateway SOLO 5300 User manual, 305 pages. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

Godber et al. Secure Wireless Gateway. RightsLink. Arizona State University, pp. 41-46 [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

Golem, WLAN-MP3-Player zum Anschluss an die Stereoanlage, Jun. 1, 2003, 2 pages.

Guttman, Erik. An API for the Zeroconf Multicast Address Allocation Protocol, Jun. 6, 2001, 11 pages.

Guttman, Erik. Autoconfiguration for IP Networking: Enabling Local Communication, Jun. 2001, 6 pages.

Guttman, Erik. Network Working Group, Zeroconf Host Profile Applicability Statement, Internet-Draft, Jul. 20, 2001, 9 pages.

Hawn, Andrew. TechTV, First Look: cd3o c300, 2004, 2 pages.

High Fidelity. New Wave in Speaker Design. Oct. 1980, 130 pages.

HomePod—Wireless Network Digital Music Player with FM Tuner, User Manual, 2003, 16 pages.

HomePod MP-100, Wireless Network Music Player, with USB Jukebox, Internet Radio, and FM Tuner, Specification, 2003, 2 pages.

HomePod. User Manual, Wireless Network Digital Audio Player with FM Tuner, 2003, 49 pages.

How cd30 Network MP3 Players Work, Feb. 2, 2004, 3 pages.

Howe et al. A Methodological Critique of Local Room Equalization Techniques, 5 pages [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

IEEE Standards 8023. Part 3: Carrier sense multiple access with collision detection CSMA/CD access method and physical layer specifications, Mar. 8, 2002, 1562 pages.

Live. Users Guide IS809B Wireless Speaker System, Copyright 2010, 12 pages.

Intel Announces WS-Discovery Spec for Joining Devices and Web Services, Intel Developer Forum Spring 2004, Feb. 17, 2004, 4 pages.

Intel Sees Unified Platform and Ecosystem as Key to Enabling the Digital Home, Intel Developer Forum, Feb. 17, 2004, 4 pages.

Intel Tools Validate First Solutions that Enable Devices to Work Together in the Digital Home, Intel Developer Forum, Feb. 17, 2004, 2 pages.

Intel. Users Manual, An Intel Socket 478 Processor Based Mainboard. Mar. 27, 2003, 96 pages.

Carnoy, David. Parrot DS1120 Wireless Hi-Fi Speaker System Review, Jul. 15, 2008, 4 pages.

Case et al. RFC 1157—A Simple Network Management Protocol, May 1990, 36 pages.

cd30. Audio Control Document V4.2 Released! Sep. 18, 2003, 7 pages.

cd30 Audio Control Protocol. Version 4.2. Sep. 18, 2003, 24 pages.

cd30. Audio Stream Protocol Released. Mar. 9, 2004, 2 pages.

Cd30. Audio Stream Protocol: Version 18. Mar. 9, 2004, 13 pages.

cd30 Backgrounder, 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

cd30. c100 Network MP3 Player. Quick Product Summary. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

cd30. c200 Wireless Network MP3 Player. Quick Product Summary. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

cd30. c300 Extended-Range Wireless Network MP3 Player. Quick Product Summary, 1 page [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

cd30 C300 Reviews. Digital Audio Receivers (DARs) Reviews by CNET, Mar. 30, 2003, 3 pages.

cd30. Careers, Nov. 21, 2003, 1 page.

cd30. Contact, Dec. 12, 2003, 1 page.

cd30. Corporate Fact Sheet, 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

cd30 FAQs. What problem or need does cd30 address with their products? 2 pages [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

cd30 Frequently-Asked Questions About cd30 Network MP3 Players, Dec. 12, 2003, 6 pages.

cd30 Introduces Family of MP3 Players at this year's Consumer Electronics Show. Jan. 9-12, 2003 Las Vegas convention Center, Feb. 12, 2004, 2 pages.

cd30 Introduces Family of MP3 Players at this year's Consumer Electronics Show. Jan. 9-12, 2003 Las Vegas Convention Center, 2 pages.

cd30 Introduces Family of Wireless Network MP3 Players. Jan. 9-12, 2003 Las Vegas Convention Center, 2 pages.

cd30. Logo page, 1 page [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

cd30 Management, Dec. 12, 2003, 1 page.

cd30. Management Team, 1 page [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

cd30. Multi-Player Synchronization. Jan. 15, 2004, 4 pages.

cd30 Network MP3 Player Models, Feb. 1, 2004, 1 page.

Cd30, Network MP3 Player, Product Manual. Copyright 2003, 65 pages.

cd30 Network MP3 Player. Product Manual for c100, c200, and c300, 2003, 65 pages.

cd30. Network MP3 Player. Quick Installation Guide, 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

cd30 Network MP3 Player Reviews. Feb. 1, 2004, 2 pages.

cd30 Network MP3 Player Specifications. Feb. 2, 2004, 2 pages.

cd30 Network MP3 Players, Nov. 18, 2003, 1 page.

cd30 Network MP3 Players c100, c200, and c300, 1 page [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

cd30 Network MP3 Players: Stream music from your PC to your stereo, Nov. 18, 2003, 1 page.

cd30 Network MP3 Players: Stream your MP3s to your stereo! May 24, 2003, 1 page.

cd30. News, Reviews Nov. 21, 2003, 2 pages.

cd30. Product Support. May 10, 2006, 17 pages.

cd30 Product Support Forums. Forum Index, Apr. 15, 2003, 1 page.

cd30 Product Support Forums. Forum Index, Jun. 18, 2003, 1 page.

cd30 Product Support Forums. Forum Index, Feb. 2, 2004, 1 page.

cd30. Product Support Forums. Multiple stereos—multiple cd30s—same music? Nov. 3, 2003, 2 pages.

cd30. Network MP3 Player, Product Manual, 2003, 65 pages.

cd30 Product Support Center, Nov. 19, 2003, 1 page.

CES: MP3-Player mit Pfiff, Jan. 13, 2003, 4 pages [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

Cheshire et al. RFC 3927—Dynamic Configuration of IPv4 Link-Local Addresses, 2005, 34 pages.

Cheshire et al. Zero Configuration Networking: The Definitive Guide. Dec. 2005, 288 pages.

Clipsal. Multi Room Audio Amplifier, User's Guide, V1.0, Dec. 2005, 28 pages.

Clipsal. Multi Room Audio Matrix Switcher, User's Guide, 560884, V1.0, Dec. 2005, 20 pages.

C-Media. CM102-A/102S USB 2CH Audio Controller, Data Sheet. Version 1.4. May 21, 2003, 20 pages.

CNET. Wireless gizmo for PC music hits home, Sep. 30, 2003, 4 pages.

Compaq et al., Universal Serial Bus Specification, Revision 2.0, Apr. 27, 2000, 650 pages.

Philips Leads Consumer Electronics Industry with 21 CES Innovation Awards. Business Wire. 2004 International CES, Jan. 6, 2004, 3 pages.

Philips. MC W7708. Wireless PC Link Quick Installation. Published Dec. 22, 2004, 8 pages.

Philips. MCW770 Leaflet. Remote Control MP3 Music from Your PC . . . Wirelessly. MP3 Micro Hi-Fi System with 5 CD Tray Changer. Published Mar. 2, 2004, 2 pages.

Philips. MCW770 Quick Use Guide. English version. Published Dec. 22, 2004, 4 pages.

Philips Media Manager 3.3.12.0004 Release Notes, last modified Aug. 29, 2006, 2 pages.

Philips. Media Manager Software—English version: PMM 3.3.12, software/ source code available via zip file ("Media Manager Software—English") published Sep. 15, 2004, 3 pages. [online],

US 10,848,885 B2

Page 23

(56)

References Cited

OTHER PUBLICATIONS

[retrieved on Feb. 24, 2020]. Retrieved from the Internet URL : https://www.usa.philips.com/c-p/MCW770_37/-/support. Philips. PC Software version: V.12.1, software/ source code available via zip file ("PC Software") published Sep. 15, 2004, 3 pages. [online], [retrieved on Feb. 24, 2020]. Retrieved from the Internet URL : https://www.usa.philips.com/c-p/MCW770_37/-/support. Philips. Wireless PC Link Micro MCW770 Custom Installation, User Manual, published Aug. 24, 2004, 61 pages. Rocketfish Wireless Outdoor Speaker RF-RBWS02 User Guide, 2009, 33 pages. snarfed/p4sync. GitHub: A library and plugins for a few music players that (attempts to) synchronize playback across multiple computers, 2 pages [online]. [retrieved on Mar. 26, 2020]. Retrieved online URL: <https://github.com/snarfed/p4sync>. Software & drivers. Micro Audio System MCW770/37. Philips. Copyright 2004-2020, 3 pages [online]. [retrieved on Feb. 24, 2020]. Retrieved from the Internet URL: https://www.usa.philips.com/c-p/MCW770_37/-/support. *Sonos, Inc. v. Google LLC*, Appendix A to Respondents' Response to the Complaint and Notice of Investigation, filed Feb. 27, 2020, 2 pages. *Sonos, Inc. v. Google LLC*, Appendix B to Respondents' Response to the Complaint and Notice of Investigation, filed Feb. 27, 2020, 176 pages. *Sonos, Inc. v. Google LLC*, Respondents' Response to the Complaint and Notice of Investigation, filed Feb. 27, 2020, 46 pages. *Sonos v. Google*. Exhibit A to Respondents' Initial Invalidity Contentions dated Apr. 29, 2020, 194 pages. *Sonos v. Google*. Respondents' Initial Invalidity Claim Charts for U.S. Pat. No. 10,439,896, Exhibits 1-16 and B, dated Apr. 29, 2020, 1102 pages. *Sonos v. Google*. Respondents' Initial Invalidity Claim Charts for U.S. Pat. No. 10,209,953, Exhibits 1-10 and B, dated Apr. 29, 2020, 288 pages. *Sonos v. Google*. Respondents' Initial Invalidity Claim Charts for U.S. Pat. No. 8,588,949, Exhibits 1-19 and B, dated Apr. 29, 2020, 280 pages. *Sonos v. Google*. Respondents' Initial Invalidity Claim Charts for U.S. Pat. No. 9,195,258, Exhibits 1-10 and B, dated Apr. 29, 2020, 345 pages. *Sonos v. Google*. Respondents' Initial Invalidity Claim Charts for U.S. Pat. No. 9,219,959, Exhibits 1-9 and B, dated Apr. 29, 2020, 344 pages. *Sonos v. Google*. Respondents' Initial Invalidity Contentions dated Apr. 29, 2020, 200 pages. Squeezebox by Logitech. Owner's Guide, 2007, 32 pages. Squeezebox Duet Network Music System by Logitech. User Guide English (North America), 2008, 45 pages. Squeezebox Network Music Player. Owner's Manual, Slim Devices, 2003, 22 pages. Step-by-step P4 Connection. P4 Poster (without music), 5 pages [online], [retrieved on Mar. 26, 2020]. Retrieved from the Internet URL: https://snarfed.org/p4_poster/index.html. Structured Media Components. Leviton Integrated Networks, last modified Apr. 10, 2006, 28 pages. Support. Manuals & Documentation. Micro Audio System MCW770/37. Philips. Copyright 2004-2020, 3 pages. [online], [retrieved on Feb. 24, 2020]. Retrieved from the Internet URL: https://www.usa.philips.com/c-p/MCW770_37/-/support. Synchronizing mp3 playback. 3 pages [online]. [retrieved on Mar. 26, 2020]. Retrieved from the Internet URL: https://snarfed.org/synchronizing_mp3_playback. Teirikangas, Jussi. HAVi: Home Audio Video Interoperability. Helsinki University of Technology, 2001, 10 pages. TOA Electronics, Inc. DP-0206 Digital Signal Processor. DACsys 2000, 2001, 12 pages. UPnP AV Architecture:0.83 for UPnP Version 1.0, Jun. 12, 2002, copyright 2000, 22 pages.

UPnP Forum. UPnP Device Architecture 1.0. Oct. 15, 2008, 80 pages. Weverka et al. Windows XP Gigabook for Dummies. Wiley Publishing, Inc. 2004, 915 pages. Wireless Home Audio Director. Wireless N Music Player with Integrated Amplifier DMC250. Datasheet. Linksys by Cisco. Fill Your Home with Music, 2008, 2 pages. Yahoo Groups. Exstreamer. Barix Exstreamer. Access via Wayback Machine <http://groups.yahoo.com/group/exstreamer/> Dec. 22, 2013, 1 page. Yamaha DME Designer 3.0 Owner's Manual; Copyright 2008, 501 pages. Introducing Roomlink Network Media Receiver—PCNA-MR10, Sony Vaio, 2003, 2 pages. IPR Details—Apple Computer's Statement About IPR Claimed in draft-ietf-zeroconf-ipv4-linklocal, Apr. 26, 2004, 3 pages. Japanese Patent Office, English Translation of Office Action dated Jun. 2, 2020, issued in connection with Japanese Application No. 2017-211958, 6 pages. Japanese Patent Office, Office Action and Translation dated Jun. 2, 2020, issued in connection with Japanese Patent Application No. 2017-211958, 9 pages. Johnson, Ian. SMC EZ-Stream Universal Wireless Multimedia Receiver—The Globe and Mail, Dec. 3, 2003, 6 pages. Kostiaainen, K., Intuitive Security Initiation Using Location-Limited Channels. Helsinki University of Technology, Master's Thesis Apr. 14, 2004, 86 pages. Kraemer, Alan. Two Speakers Are Better Than 5.1—IEEE Spectrum, May 1, 2001, 6 pages. Linksys 2.4GHz Wireless-B—User Guide Media Link for Music Model WML11B/WMLS11B, 68 pages [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020]. Linksys 2.4GHz Wireless-B—User Guide V2 Model WMA11B, 68 pages [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020]. Linksys. Quick Installation for Windows XP only. Wireless-B Media Adapter, 2 pages [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020]. Linksys. Wireless Adapters, 2003, 2 pages. Linksys. Wireless PrintServer, User Guide, Model No. WPS11 Version 3, 2002, 31 pages. Linksys Wireless-B Media Adapter—User Guide V1 Model WMA11B, 2003, 32 pages. Linksys. Wireless-B Media Adapter, Product Data, Model No. WMA11B, 2003, 2 pages. Linksys. Wireless-B Media Adapter, WMA11B, 2003, 2 pages. Ljungstrand et al. UBICOMP 2002, Adjunct Proceedings, Fourth International Conference on Ubiquitous Computing, 2002, 90 pages. Logitech Slimserver. Server for Logitech Squeezebox Players. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020]. Logitech/slimserver. Github. 1 page. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020]. Logitech/Slimserver. Github. Version 23 Release. May 19, 2002. 2 pp. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020]. Marchetti, Nino. EdgeReview, CES 2003 Home Network Entertainment, Jan. 28, 2003, 2 pages. McGlaun, Shane. Best Buy unveils new Rocketboost RF-RBKIT whole home audio solution and more. Oct. 22, 2009, 7 pages. MediaLounge Entertainment Network D-Link DSM-320 Wireless Media Player Manual v 1.0, 59 pages [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020]. Micro-Star International. 865PE Neo2. MS-6728 v1.X ATX Mainboard. Version 1.1. Apr. 2003, 118 pages. Miller II, Stanley. Technology gets simpler and smarter. JSoOnline Milwaukee Journal Sentinel, Jan. 13, 2003, 3 pages. Moses, B., Home Networking Using IEEE 1394 in Combination with Other Networking Technologies. Audio Delivery. The Changing Home Experience—AES 17 UK Conference 2002, 16 pages. Muherim et al. On the Performance of Clock Synchronization Algorithms for a Distributed Commodity Audio System. Audio Engineering Society Convention Paper presented at 114th Convention Mar. 22-25, 2003, 12 pages.

US 10,848,885 B2

Page 24

(56)

References Cited

OTHER PUBLICATIONS

Murph, Darren. Rocketfish Wireless Whole Home Audio System Cuts the Cord on All Your Speakers. Engadget. October 23, 2009, 9 pages.

Musica MU4602. Audio Distribution System. Data Sheet, 2004, 2 pages.

MusicCAST. Interactive Wireless. Home Music Network System, 6 pages. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].

MusicCAST System—About the Quick Manual, 1999, 7 pages.

NETGEAR. User's Manual for the MP101 Digital Music Player, Version 1.2, May 2004, 48 pages.

NetStreams. Musica MU4602 Audio Distribution System. Data Sheet. Copyright 2004, 2 pages.

NetStreams. Panorama PAN6400 Multi-Room Video & Control System Installation Guide, Jan. 2, 2006, 64 pages.

NetStreams Product Catalog 2003-2004. Creating the Future of Home Entertainment Today 20 pages.

Network Working Group. Zeroconf Multicast Address Allocation Protocol, Internet-Draft, Oct. 22, 2002, 14 pages.

NewRoom. Sirius, XM Companies Flood Cedia with New Products, Sep. 15, 2003, 2 pages.

NewRoom. SMC Ships New EZ-Stream Universal 80211ag Wireless Router, Jan. 14, 2004, 3 pages.

NewsRoom. AP DataStream, Wall Street Journal Digest, Jan. 15, 2004, 3 pages.

NewsRoom. AP Online, AP Technology NewsBrief. Dec. 26, 2003, 2 pages.

NewsRoom. AP Online, AP Technology NewsBrief. Dec. 27, 2003, 2 pages.

NewsRoom. Belleville News Democrat, Tunes, Pictures From Computer Can Be Sent to Your TV, Stereo, Dec. 27, 2003, 2 pages.

NewsRoom. BridgeCo Successfully Concludes Second Financing Round of US \$13.3 Million, Business Wire, Jan. 9, 2003, 3 pages.

NewsRoom. Business Line, Cisco arm rolls out products for SOHO. Nov. 5, 2003, 2 pages.

NewsRoom. Business Wire, BridgeCo Adds Wireless Connectivity and Enhances Surround Sound Processing for New Generation Speakers. May 5, 2003, 3 pages.

NewsRoom. Business Wire, BridgeCo Launches Entertainment Network Adapter at CES2003, Jan. 9, 2003, 3 pages.

NewsRoom. Business Wire, BridgeCo Launches Entertainment Network Adapter for Pro Audio at NAMM Show, Jan. 16, 2003, 3 pages.

NewsRoom. Business Wire, BridgeCo Opens USA Business Development HQ in Silicon Valley and Expands Management Team, Mar. 15, 2004, 3 pages.

NewsRoom. Business Wire, BridgeCo Releases Silicon and Firmware Platform Compatible with Microsoft Windows Media Connect and Windows Media DRM Technology. May 3, 2004, 3 pages.

NewsRoom. Business Wire, CSR and BridgeCo Launch Design for New Generation Wireless Speakers; Transforms Traditional Speakers into Portable Internet Radio, May 6, 2003, 3 pages.

NewsRoom. Business Wire, Epson Announces the EPSON Stylus Photo 900: The First Photo Printer Under \$200 to Print Directly Onto CDs and DVDs; New Printer Offers a Complete Printing Solution for Digital Lifestyles, Apr. 16, 2003 4 pages.

NewsRoom. PR Newswire, "Home Director Announces Availability of AudioPoint Receiver," Sep. 27, 2002, 4 pages.

NewsRoom. Preview the New EZ-Stream Wireless Audio Adapter at CES Jan. 8-11, 2004 BridgeCo Booth 19629, Jan. 7, 2004, 3 pages.

NewsRoom. Receiver Lets Stereo Join The Wi-Fi Band, Apr. 10, 2003, 2 pages.

NewsRoom. Rogers, P., Speaker Screech: The End Is Near, Apr. 8, 2003, 2 pages.

NewsRoom. San Jose Mercury News, Intel Fund to Invest in Digital Home, Jan. 7, 2004, 2 pages.

NewsRoom. Science & Technology: Wired for sound and video, Jan. 14, 2004, 3 pages.

NewsRoom, Sears reveals plans for new Eatons stores, Oct. 26, 2000, 3 pages.

NewsRoom. Seattle Times, Inventions real stars of the show As speeches predict future 100,000 browse 'superstore', Jan. 13, 2003, 4 pages.

NewsRoom, Sensible Sound, Goin' to a show-show, Surveying the Soundscape, Jun. 1, 2003, 8 pages.

NewsRoom. Shaw, K., Cool Tools, Jan. 20, 2003, 2 pages.

NewsRoom. Sheehan, W., More brains, less brawn. Sep. 1, 2003, 3 pages.

NewsRoom. Sidener, J., Everett Roach, Jul. 14, 2003, 2 pages.

NewsRoom. Sirius XM Companies Flood Cedia With New Products. Satellite Week. Sep. 15, 2003, 2 pages.

NewsRoom. Slim Devices Introduces Slimserver, Nov. 18, 2003, 2 pages.

NewsRoom. Slim Devices Introduces Slimserver. PR Newswire. Nov. 18, 2003, 2 pages.

NewsRoom. Slim Devices Introduces Squeezebox, Nov. 18, 2003, 2 pages.

NewsRoom. SMC Sponsors Canada's First Combined 'LAN Event' for Gamers: DreamlanSMC, Jan. 15, 2004, 2 pages.

NewsRoom. SMC Sponsors Canada's First Combined 'LAN Event' for Gamers: DreamlanSMC, Jan. 15, 2004, 3 pages.

NewsRoom. SMC Sponsors Home by Design Showhouse/Connected by Design Tour, Jan. 6, 2004, 3 pages.

NewsRoom. SMC Teams with Get Digital to Offer Free Music Conversion to Its Wireless Audio Adapter Users, Feb. 23, 2004, 3 pages.

NewsRoom. SMC teams with Get Digital to offer free music conversion to wireless users, Mar. 29, 2004, 1 page.

NewsRoom. SMC to Offer Home Entertainment Networking Bundle With New Intel Desktop Boards, Nov. 3, 2003, 3 pages.

NewsRoom. Sonic divide crumbles, 2001 WLN 5430795. Sep. 5, 2001, 3 pages.

NewsRoom. Sound and Fury the Latest in Volume And Video At SF Home Entertainment Show Jun. 6, 2003, 3 pages.

NewsRoom. Sound Blaster Goes Wireless, Sep. 30, 2003, 3 pages.

NewsRoom. St. Paul Pioneer Press, Guide to Better Giving You Know These People. Why Is It So Hard to Buy for Them? Maybe It's Not: Everyone Need Technology, From the Littlest Angel to the Most Resistant Grandparent, Nov. 24, 2003, 6 pages.

NewsRoom. Sullivan, A., PluggedIn—Digital music migrates to the home stereo, Oct. 28, 2003, 3 pages.

NewsRoom. Tech along, Jan. 25, 2004, 3 pages.

NewsRoom. Technology Life in the iPad. Mar. 15, 2007, 5 pages.

NewsRoom. Televisions defy hi-tech trend for minimalism, Feb. 19, 2004, 3 pages.

NewsRoom. The 50 Best Music Systems, Dec. 13, 2003, 15 pages.

NewsRoom. The Age (Australia), Fresh Gadgets, 2001 WLN 13294645, Sep. 7, 2001, 3 pages.

NewsRoom. The Dallas Morning News, Honorable mentions worth a look, Nov. 20, 2003, 2 pages.

NewsRoom. The Dallas Morning News, Innovations Hasten Trend of On-the-Go Music, Video, Technology, Jan. 16, 2003, 4 pages.

NewsRoom. The Dallas Morning News, Wireless Technology Focus of Consumer Electronics Show in Las Vegas, Jan. 9, 2003, 4 pages.

NewsRoom, The Goods Whats' New What's Hot, Nov. 9, 2000, 2 pages.

NewsRoom. The Next Ace in the Hole?—Epson HP set the stage for promising alternatives to wired solutions in vertical markets, Jan. 14, 2002, 3 pages.

NewsRoom. The Orange County Register, Holiday Season Brings Gift Ideas for Tech-Heads, Gadget Groupie, Dec. 8, 2003, 4 pages.

NewsRoom. The personal computer shows its creative side. Technology has discovered its next "killer app." Aug. 14, 2003, 3 pages.

NewsRoom. The top 25: computer shopper editors handpick this month's best desktops notebooks digital audio receivers, handhelds, and software. Nov. 1, 2003, 3 pages.

NewsRoom. The toys of summer: Some cool tools that will get you through the lazy days. Sep. 1, 2003, 3 pages.

NewsRoom. The wide world of Wi-Fi: wherever you are, wireless networking is where it's at. Find out which Wi-Fi components will help you stay connected while . . . May 1, 2004, 7 pages.

(56) **References Cited**

OTHER PUBLICATIONS

- NewsRoom. Ticker, Aug. 1, 2003, 2 pages.
- NewsRoom. Washington Post, Ask the Computer Guy, Jan. 11, 2004, 2 pages.
- NewsRoom. Yamaha Announces the Worlds First Wireless Home Music System. Aug. 11, 2003, 2 pages.
- NewsRoom. Yamaha Musiccast an easy way to spread music around your home. Dec. 1, 2003, 2 pages.
- NewsRoom.Slim Devices Introduces Squeezebox. PR Newswire. Nov. 18, 2003, 2 pages.
- Niles SI-1230. Systems Integration Amplifier. Installation & Operation Guide, 2009, 32 pages.
- Niles SI-1260. Systems Integration Amplifier. Installation & Operation Guide, 2000, 32 pages.
- Olenick, Doug. Networked MP3 Player Lineup Bows From cd30. Jan. 9, 2003, 6 pages.
- European Patent Office, European Office Action dated Sep. 16, 2019, issued in connection with European Application No. 17198867. 8, 6 pages.
- Non-Final Office Action dated Sep. 27, 2019, issued in connection with U.S. Appl. No. 15/405,931, filed Jan. 13, 2017, 13 pages.
- Sonos, Inc. v. Implicit, LLC*: Declaration of Roman Chertov in Support of the Inter Partes Review of U.S. Pat. No. 7,391,791 dated Mar. 9, 2018, 92 pages.
- Sonos, Inc. v. Implicit, LLC*: Declaration of Roman Chertov in Support of the Inter Partes Review of U.S. Pat. No. 8,942,252 dated Mar. 9, 2018, 81 pages.
- Sonos, Inc. v. Lenbrook Industries Limited et al.*, Defendants' Answer to Plaintiffs Complaint—Exhibit A, filed Oct. 14, 2019, 3 pages.
- Sonos, Inc. v. Lenbrook Industries Limited et al.*, Defendants' Answer to Plaintiffs Complaint—Exhibit C, filed Oct. 14, 2019, 16 pages.
- Sonos, Inc. v. Lenbrook Industries Limited et al.*, Defendants' Answer to Plaintiffs Complaint—Exhibit D, filed Oct. 14, 2019, 36 pages.
- Sonos, Inc. v. Lenbrook Industries Limited et al.*, Defendants' Answer to Plaintiffs Complaint—Exhibit E, filed Oct. 14, 2019, 21 pages.
- Sonos, Inc. v. Lenbrook Industries Limited et al.*, Defendants' Answer to Plaintiffs Complaint, filed Oct. 14, 2019, 66 pages.
- Sonos, Inc. v. Lenbrook Industries Limited et al.*, Defendants' First Amended Answer and Counterclaims to Plaintiff's Complaint, filed Nov. 14, 2019, 66 pages.
- Wired. Total Remote Control, Issue 11.06, Jun. 2003, 2 pages.
- Wireless USB Adapter 11g CPWUA054, CPWUA054/00, CPWUA054/37, User Manual, Version: 1.0, Dec. 2003, 29 pages.
- Yahoo Finance. BridgeCo Successfully Commercializes its BeBoB Application for the Music Industry: Four Manufacturers Demonstrate BeBoB-enabled Products at NAMM 2004. Jan. 16, 2004, 3 pages.
- Yamaha Digital Audio Server, MCX-1000, Owner's Manual, 1996-2002, 148 pages.
- Yamaha MusicCAST Digital Audio Server MCX-1000 Owner's Manual, Copyright 1996-2002, 148 pages.
- Yamaha, MusicCAST: Digital Audio Terminal MCX-A10, Owner's Manual. Jun. 4, 2003, 76 pages.
- Yamaha Personal Receiver RP-U200 Operation Manual ("Operation Manual"), Copyright 1992-1997, 57 pages.
- Zero configuration networking with Bonjour—YouTube available via <https://www.youtube.com/watch?v=ZhtZJ6EsCXo> 3 pages [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].
- Zeroconf Working Group, Dynamic Configuration of IPv4 Link-Local Addresses, Internet-Draft, Jul. 8, 2004, 62 pages.
- Zeroconf Working Group, Dynamic Configuration of IPv4 Link-Local Addresses, Internet-Draft, Jul. 1, 2004, 60 pages.
- Zeroconf Working Group, Dynamic Configuration of IPv4 Link-Local Addresses, Internet-Draft, Jun. 7, 2004, 62 pages.
- Zeroconf Working Group, Dynamic Configuration of Link-Local IPv4 Addresses, Internet-Draft, Feb. 16, 2004, 60 pages.
- Zeroconf Working Group, Dynamic Configuration of Link-Local IPv4 Addresses, Internet-Draft, Mar. 31, 2004, 60 pages.
- Olenick, Doug. Twice, Networked MP3 Player Lineup Bows from cd30, Jan. 9, 2003, 2 pages.
- Omnifi A Simple Media Experience. DMSI User Manual, Jul. 2003 36 pages.
- Omnifi DMSI Wi-Fi Media Receiver p. 2, Sound & Vision, Copyright 2020, 7 pages.
- Omnifi DMSI Wi-Fi Media Receiver p. 3, Sound & Vision, Copyright 2020, 5 pages.
- Parrot—All Products—Bluetooth Hands Free Car Kits, Oct. 21, 2008, 3 pages.
- Parrot DS1120—Wireless Hi-Fi Stereo Sound System, Nov. 22, 2008, 3 pages.
- Pinnacle ShowCenter. Pinnacle Systems, Mar. 2005, 132 pages.
- Pohlmann, Ken. Omnifi DMSI Wi-Fi Media Receiver. Sound & Vision, Oct. 20, 2003, 7 pages.
- Publishing Network Services. Apple Developer Connection. Rendezvous Network Services: Publishing Network Services, Nov. 12, 2002, 6 pages.
- Rendezvous Network Services: Resolving and Using Network Services. Apple Developer Connection, Nov. 12, 2002, 5 pages.
- Rendezvous Network Services: About Rendezvous. Apple Developer Connection, Nov. 12, 2002, 5 pages.
- Rocketfish. Digital Wireless Speakers. RF-WS01/WS01-WNVS02 User Guide, 2008, 28 pages.
- Roku SoundBridge Network Music Player User Guide v2.5, 2006, 40 pages.
- Rose, B., Home Networks: A Standards Perspective. In-Home Networking, IEEE Communications Magazine, Dec. 2001, 8 pages.
- Schertel, Barry. Griffin Evolve Wireless iPod Speakers, Feb. 18, 2008, 4 pages.
- Shannon, Victoria. The New York Times, Company supports Apple: Philips sets up a 'Rendezvous', Sep. 11, 2002, 2 pages.
- Sieborger, D. R., Multiprotocol Control of Networked Home Entertainment Devices, Feb. 2004, 131 pages.
- SMC EZ-Stream Universal Wireless Multimedia Receiver—NextUp, Dec. 5, 2003, 4 pages.
- SMC Network. SMCWMR-AG—EZ-Stream Universal Wireless Multimedia Receiver, Dec. 3, 2003, 2 pages.
- SMC Networks Consumer Site. About SMC: Press Release Details, Feb. 21, 2004, 2 pages.
- SMC Networks Consumer Site. Products: Home Entertainment Networking, Dec. 10, 2003, 1 page.
- SMC Networks Consumer Site. Products: Home Entertainment Networking, Feb. 7, 2004, 1 page.
- SMC Networks Consumer Site. Support: Support Center Downloads, Feb. 7, 2004, 1 page.
- SMC Networks EZ-Stream Universal 2.4GHz/5GHz Wireless Multimedia Receiver. SMCWMR-AG Users Manual, 60 pages [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].
- SMC Networks. SMCWAA-B EZ-Stream 2.4GHz Wireless Audio Adapter. User Guide, 2004, 51 pages.
- SMC Networks. SMCWMR-AG EZ-Stream Universal Wireless Multimedia Receiver. User Guide, 2003, 43 pages.
- SMC-GT1255FTX-SC EZ Card. SMC Networks: What's New, Feb. 5, 2004, 7 pages.
- Sony. Home Theatre System. HT-DDW790 and HT-DDW685 Operating Instructions, 2007, 64 pages.
- Sony Shows Off Range of Home LANs, Dec. 15, 2000, 1 page.
- Sound Blaster, Wireless Music. User's Guide: Creative Sound Blaster Wireless Music Version 1.0, Aug. 2003, 66 pages.
- Space.com. Tech Today: News about the latest gizmos and gadgets conveniently available on Earth, Feb. 14, 2004, 2 pages.
- Steve Jobs introduces AirPort Express All Things D2 (2004)—YouTube available via https://www.youtube.com/watch?v=hq5_P90pQoQ 3 pages, [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].
- Technology. cd30 is developing products which implement NAVOS, allowing consumers to get better utility out of their home media libraries. Nov. 21, 2003, 1 page.

US 10,848,885 B2

Page 26

(56) References Cited

OTHER PUBLICATIONS

- Thaler et al. Scalability and Synchronization in IEEE 1394-Based Content-Creation Networks. Audio Engineering Society Convention Paper 5461, Sep. 21-24, 2001, 16 pages.
- Tom's Hardware Guide: Nachrichten. Nachrichten vom Jan. 10, 2003, 3 pages. [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].
- Trask, Simon. NewsRoom, Pro Sound News Europe, Bluetooth to drive wireless speakers, vol. 18; Issue 6, Jun. 1, 2003, 2 pages.
- Tsai et al. SIM-based Subscriber Authentication for Wireless Local Area Networks, 2003, 6 pages.
- United States Patent and Trademark Office, U.S. Appl. No. 60/379,313, filed May 9, 2002, entitled "Audio Network Distribution System," 49 pages.
- United States Patent and Trademark Office, U.S. Appl. No. 60/379,313, filed May 9, 2002, entitled "Audio Network Distribution System," 50 pages [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].
- Urien et al. EAP-TLS Smartcards, from Dream to Reality, 4th Workshop on Applications and Services in Wireless Networks, Aug. 9, 2004, 19 pages.
- Valtchev et al. In Home Networking, Service Gateway Architecture for a Smart Home, Apr. 2002, 7 pages.
- Wi-Fi Alliance. Wi-Fi Protected Setup Specification, Version 1.0h, Dec. 2006, 110 pages.
- Wildstrom, Stephen. At CES, Cool Tech Still Rules. BusinessWeek Online, Jan. 13, 2003, 3 pages.
- Wilkins, N., SMC SMCWMR-AG EZ-Stream (wireless) review. CNET, Feb. 8, 2004, 3 pages.
- Wilkins, N., SMC SMCWMR-AG EZ-Stream (wireless) review. CNET, Feb. 8, 2004, 5 pages.
- Williams, A. Zero Configuration Networking. Requirements for Automatic Configuration of IP Hosts, Sep. 19, 2002, 19 pages.
- Williams, Stephen. NewsRoom, Going Wireless, Oct. 21, 2003, 2 pages.
- Williams, Stephen. NewsRoom, Newsday, As Wireless Evolves, Compatibility is Key, Jul. 21, 2003, 3 pages.
- Windows XP: The Complete Reference—Chapter 19 Working with Sound, 6 pages [produced by Google in Inv. No. 337-TA-1191 on May 6, 2020].
- Amazon: Philips MCW770 WiFi Wireless PC Link AM/FM 5-CD Microsystem (Discontinued by Manufacturer): Home Audio & Theater, 5 pages [online]. [retrieved on Feb. 24, 2020]. Retrieved from the Internet URL: <https://www.amazon.com/gp/product/B000278KLC>.
- Ashcroft et al. P4 Protocol Specification vo.2. Apr. 6, 2002, 11 pages [online]. [retrieved on Mar. 26, 2020]. Retrieved from the Internet URL: <https://snarfed.org/p4protocol>.
- AudioPoint from Home Director. Play Digital Music on Your Conventional Stereo System, 2002, 2 pages.
- AudioPoint, Welcome to the coolest way to listen to digital music over your conventional stereo equipment, Home Director HD00B02, 2002, 2 pages.
- Barix Download Exstreamer Software. Accessed via WayBack Machine, Apr. 6, 2003. <http://www.barix.com/estreamer/softwaradownload.html>. 2 pages.
- Barix. Exstreamer Datasheet. Accessed via WayBack Machine, Apr. 2, 2003. <http://www.barix.com/exstreamer/>, 1 page.
- Barret, Ryan. P4 Proposal: CS194 Project Proposal. Toward an Application-Independent Distributed Network Platform. Apr. 9, 2002, 4 pages [online]. [retrieved on Mar. 26, 2020]. Retrieved from the Internet URL: <https://snarfed.org/p4proposal>.
- Barrett, Ryan. (no title) Blog on P4Sync network and code, 1 page [online], [retrieved on Mar. 26, 2020]. Retrieved from the Internet URL: <https://snarfed.org/p4>.
- Bose. The Bose Lifestyle 50 System. Owner's Guide, Oct. 17, 2001, 55 pages.
- Canadian Patent Office, Canadian Office Action dated Jan. 27, 2020, issued in connection with Canadian Application No. 3032479, 4 pages.
- Chinese Patent Office, Third Office Action and Translation dated Dec. 30, 2019, issued in connection with Chinese Application No. 201610804134.8, 10 pages.
- C-Media Electronics Inc. CMI8768/8768+ Advanced Driver Software Architecture. User Manual, Revision: 1.0, May 25, 2004, 29 pages.
- C-Media XeaR 3D Sound Solution. CMI8738 416-Channel PCI Audio Single Chip. User Manual, Rev. 2.1, May 21, 2002, 44 pages.
- Connected Planet. Using PC Link. Streamium PC Link by Philips. Models MC-i200/250, SL300i, SL400i, MX6000i, last modified Aug. 5, 2004, 2 pages.
- Creating the Future of Home Entertainment Today. NetStreams Product Catalog 2003/2004, 20 pages.
- Crest Audio Pro Series 8001 Power Amplifier. V. 2.2 Mar. 25, 1997, 2 pages.
- Davies, Chris. Sony Ericsson MS500 Bluetooth Splashproof Speaker. <http://www.slashgear.com/sony-ericsson-ms500-bluetooth-splashproof>. Mar. 17, 2009, 2 pages.
- Denon AVR-3805 A/V Surround Receiver. Datasheet, last modified Mar. 1, 2004, 2 pages.
- Digram. EtherSound ES8in/8out Ethernet Audio Bridges. Easy and Cost-Effective Audio Distribution, Nov. 2002, 4 pages.
- DP-0206 TOA Digital Signal Processor. TOA Corporation, 2001, 4 pages.
- Exstreamer. Network MP3 player for digital audio streaming in a consumer, home installation and commercial applications. Barix Think Further. Sep. 2002, 2 pages.
- Exstreamer. The Exstreamer Instruction Manual. Barix Think Further Version 1.5, Oct. 2002, 21 pages.
- Exstreamer. The Exstreamer Technical Description: Version 1.5. Barix Think Further. Oct. 2002, 36 pages.
- Final Office Action dated Feb. 12, 2020, issued in connection with U.S. Appl. No. 15/130,919, filed Apr. 15, 2016, 15 pages.
- Final Office Action dated Apr. 20, 2020, issued in connection with U.S. Appl. No. 15/405,931, filed Jan. 13, 2017, 8 pages.
- FireBall Digital Music Manager E-40 and E-120. Meet FireBall. The Industry's choice for managing your entire music collection. Datasheet. 2003, 2 pages.
- Fireball E2 User's Manual. Escient. Gracenote cddb. 2000-2004, 106 pages.
- Setting to know Logitech Squeezebox Touch Wi-Fi Music Player. Features Guide, 2010, 36 pages.
- Google's Answer to Complaint and Counterclaims filed with United States District Court Central District of California, Western Division on Mar. 2, 2020, 50 pages.
- Google's Counterclaims to Sonos's Complaint filed with United States District Court Central District of California, Western Division on 11 Mar. 2020, 13 pages.
- HP Deskjet 5850 User Guide, copyright 2003, 217 pages.
- LA Audio ZX135E 6 Zone Expander. Pro Audio Design Pro. Inc. <https://www.proaudiodesign.com/products/la-audio-zx135e-6-zone-expander>, accessed Mar. 26, 2020, 6 pages.
- Microsoft Windows XP Student Edition Complete. University of Salford. Custom Guide Learn on Demand, 2004, 369 pages.
- Model MRC88 Eight Zone—Eight Source AudioNideo Controller/Amplifier System, Xantech Corporation, 2003, 102 pages.
- Multi-Zone Control Systems. ZR-8630AV MultiZone Receiver. Niles. <http://www.ampersandcom.com/zr8630av.html> accessed Mar. 26, 2020, 5 pages.
- Musica 5000 Series. Multi-Room Audio System, NetStreams, 2005, 7 pages.
- Musica MUR2E Network Interface. NetStreams Creating the future of home entertainment—today, 2004, 2 pages.
- Musica MUR2EM Network Interface. NetStreams the IP Based Distributed Entertainment Company, 2005, 2 pages.
- NetStreams Musica MU5066. Multi-Room Audio System. Installation and User's Guide, 2005, 44 pages.
- NetStreams Musica. NS-MU4602 Audio Distribution System, Integration & Design Guide. The IP-Based Audio Distribution Company, 2004, 22 pages.
- Non-Final Office Action dated Mar. 11, 2020, issued in connection with U.S. Appl. No. 16/773,966, filed Jan. 27, 2020, 34 pages.

US 10,848,885 B2

Page 27

(56)

References Cited

OTHER PUBLICATIONS

Non-Final Office Action dated Apr. 13, 2020, issued in connection with U.S. Appl. No. 16/297,991, filed Mar. 11, 2019, 16 pages.
Non-Final Office Action dated Feb. 13, 2020, issued in connection with U.S. Appl. No. 16/422,160, filed May 24, 2019, 8 pages.
Notice of Allowance dated Nov. 27, 2019, issued in connection with U.S. Appl. No. 16/128,443, filed Sep. 11, 2018, 5 pages.
P4 0.3.1 software/source code available via link (“Download P4 0.3.1.”) 1 page [online]. [retrieved on Mar. 26, 2020]. Retrieved from the Internet URL: <http://snarfed.org/p4>.
p4sync/player.cpp. GitHub. Copyright 2005, 4 pages [online]. [retrieved on Mar. 26, 2020]. Retrieved from the Internet URL: <http://github.com/snarfed/p4sync/blob/master/player.cpp>.
Parrot DS1120 User Guide, English. Retrieved on Mar. 26, 2020, 11 pages.
Parrot DS1120 User Manual, 2007, 22 pages.
Philips. Installation CD Content, software/ source code available via zip file (“Installation CD Content”) published Sep. 15, 2004, 3 pages [online]. [retrieved on Feb. 24, 2020]. Retrieved from the Internet URL: https://www.usa.philips.com/c-p/MCW770_37/-/support.
Final Office Action dated Aug. 4, 2020, issued in connection with U.S. Appl. No. 16/422,160, filed May 24, 2019, 12 pages.
Non-Final Office Action dated Aug. 6, 2020, issued in connection with U.S. Appl. No. 15/130,919, filed Apr. 15, 2016, 17 pages.

* cited by examiner

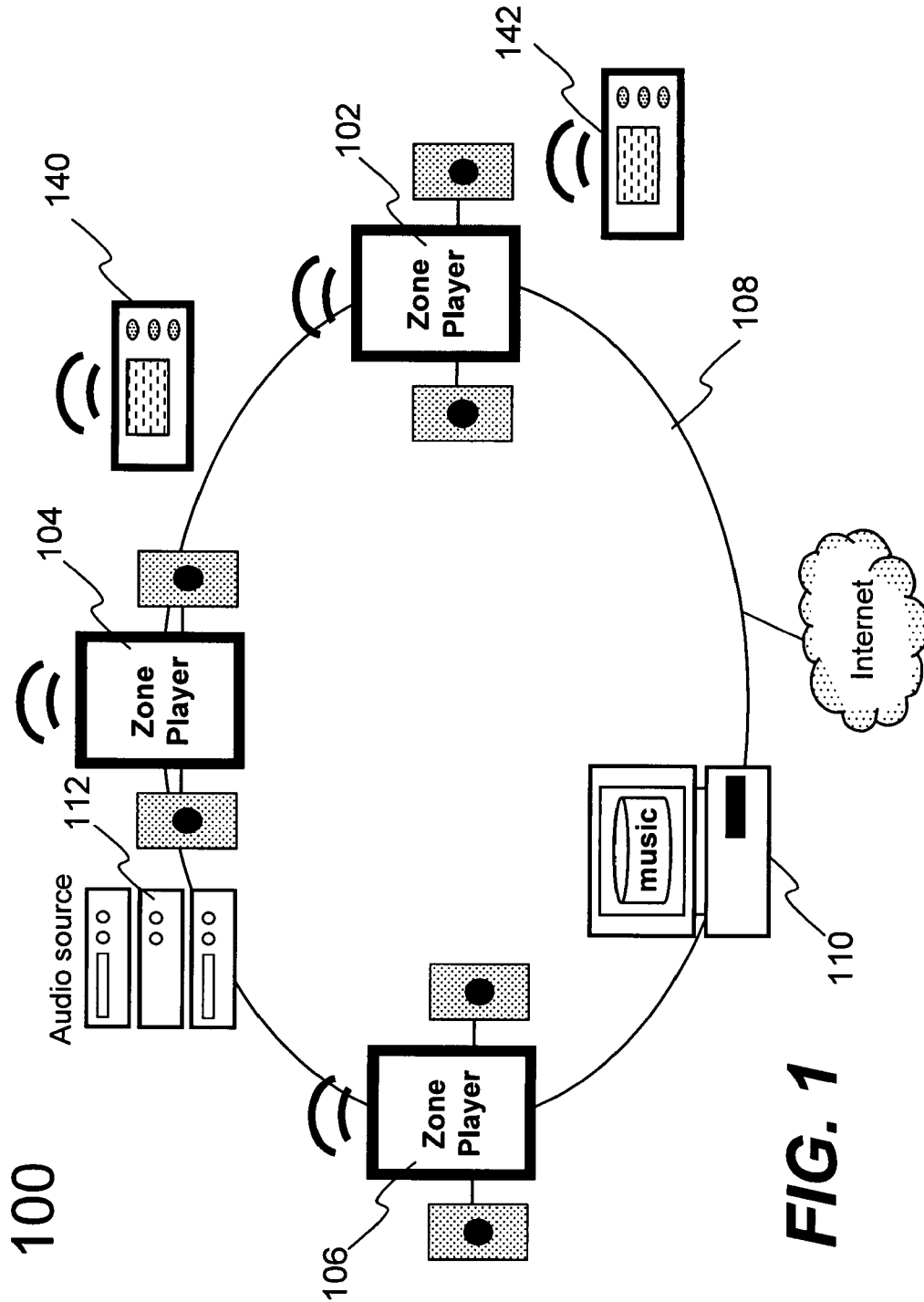


FIG. 1

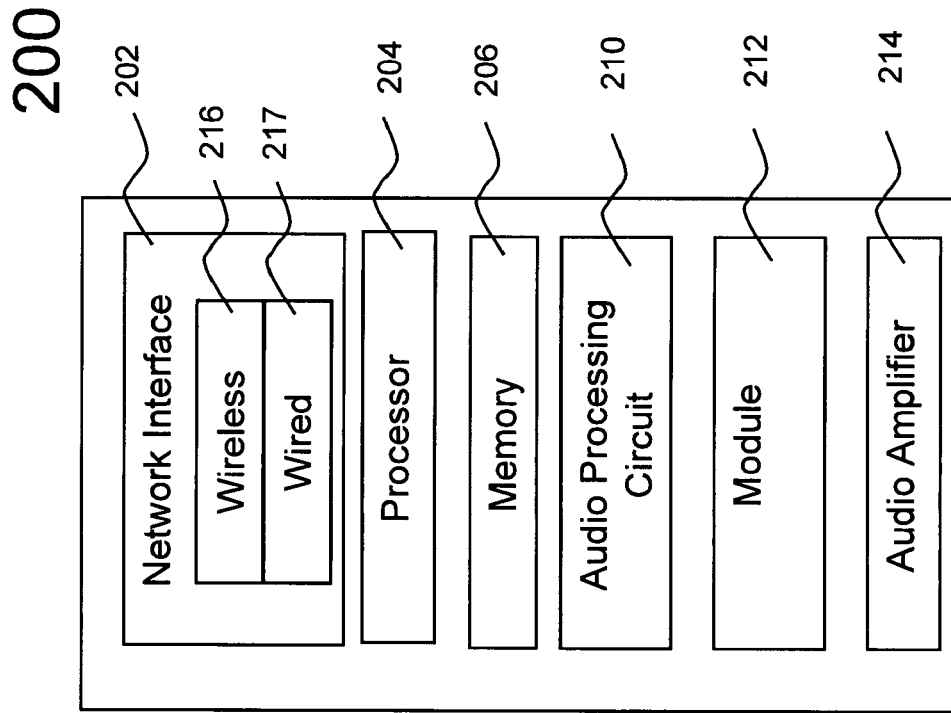


FIG. 2A

240

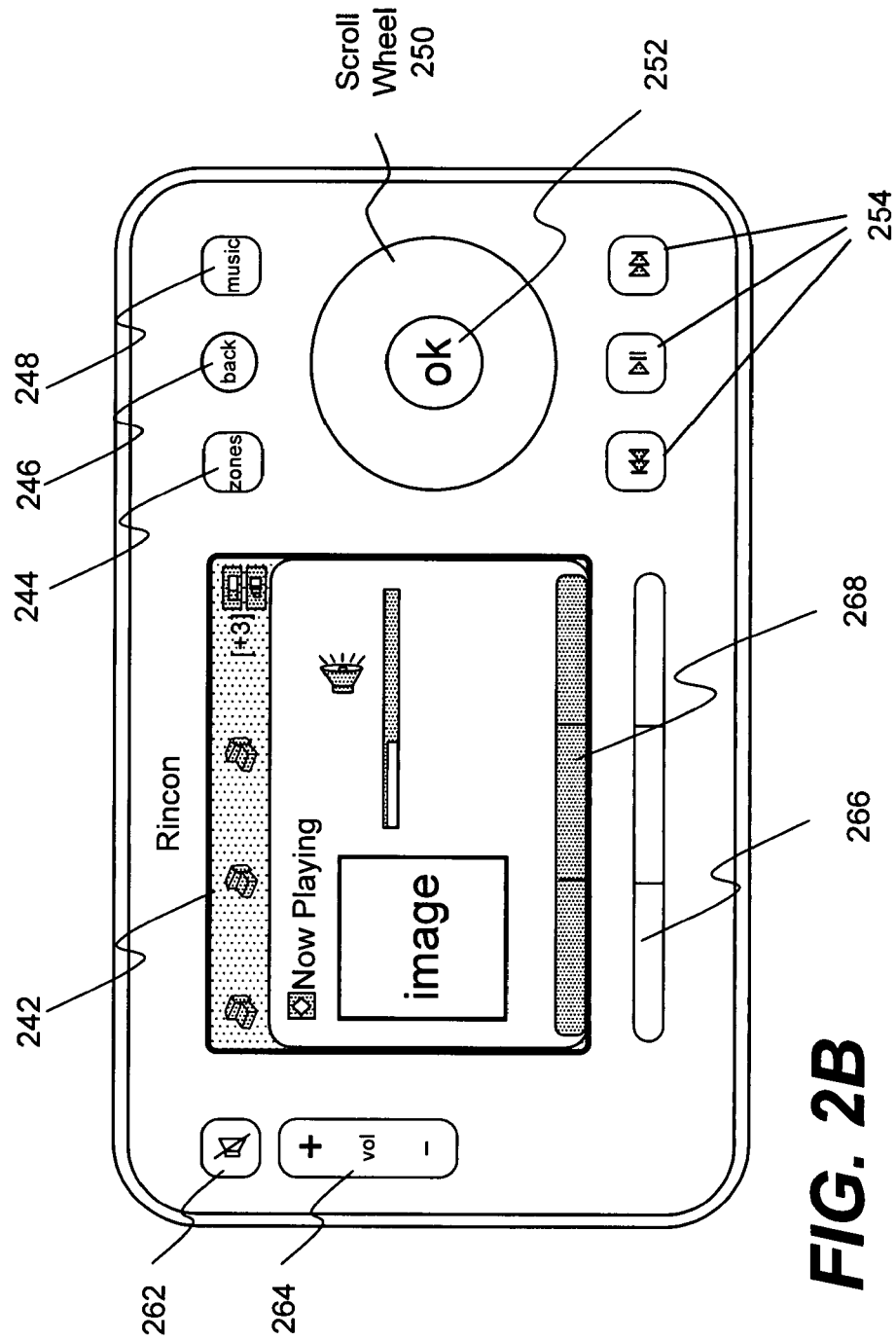
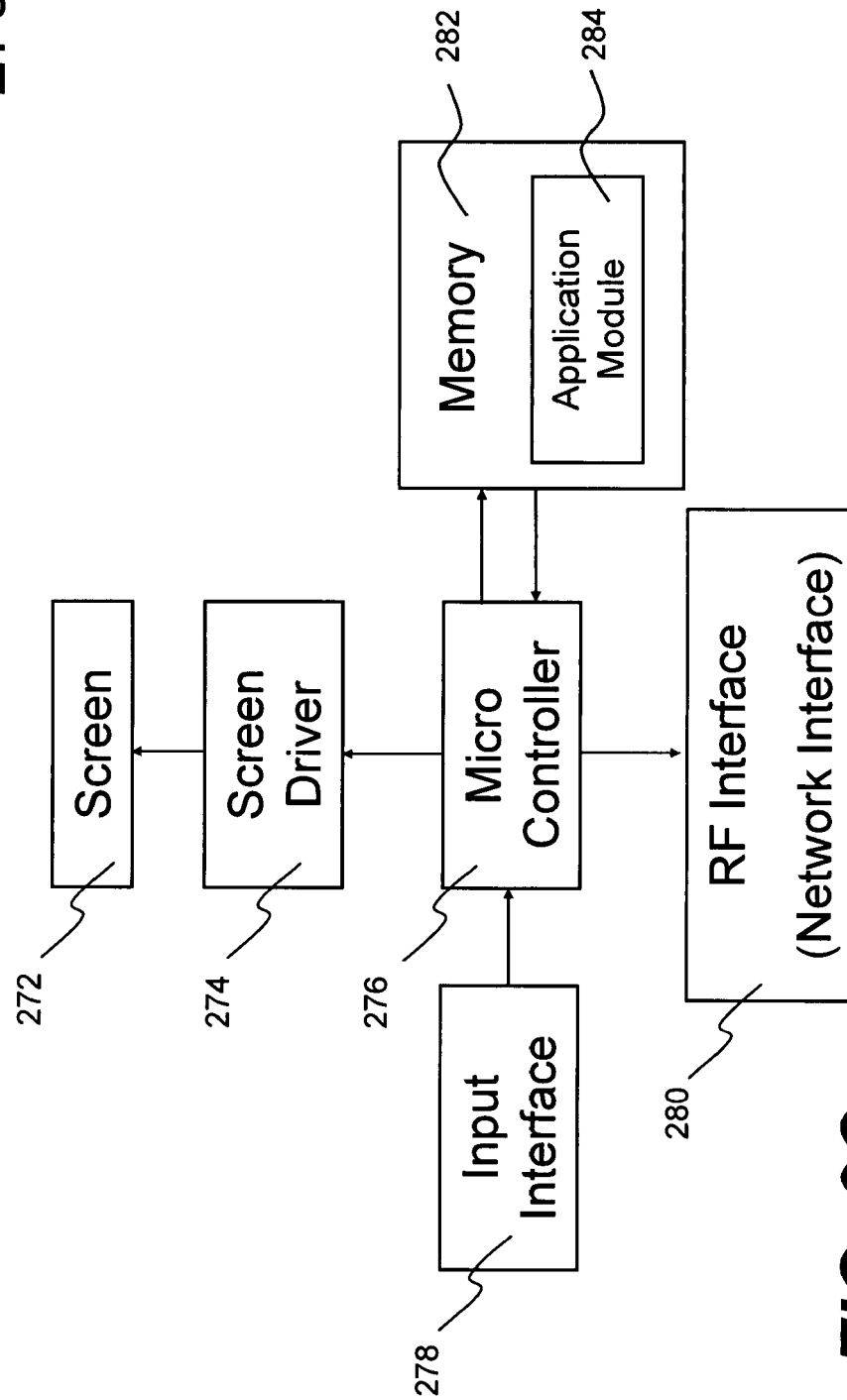
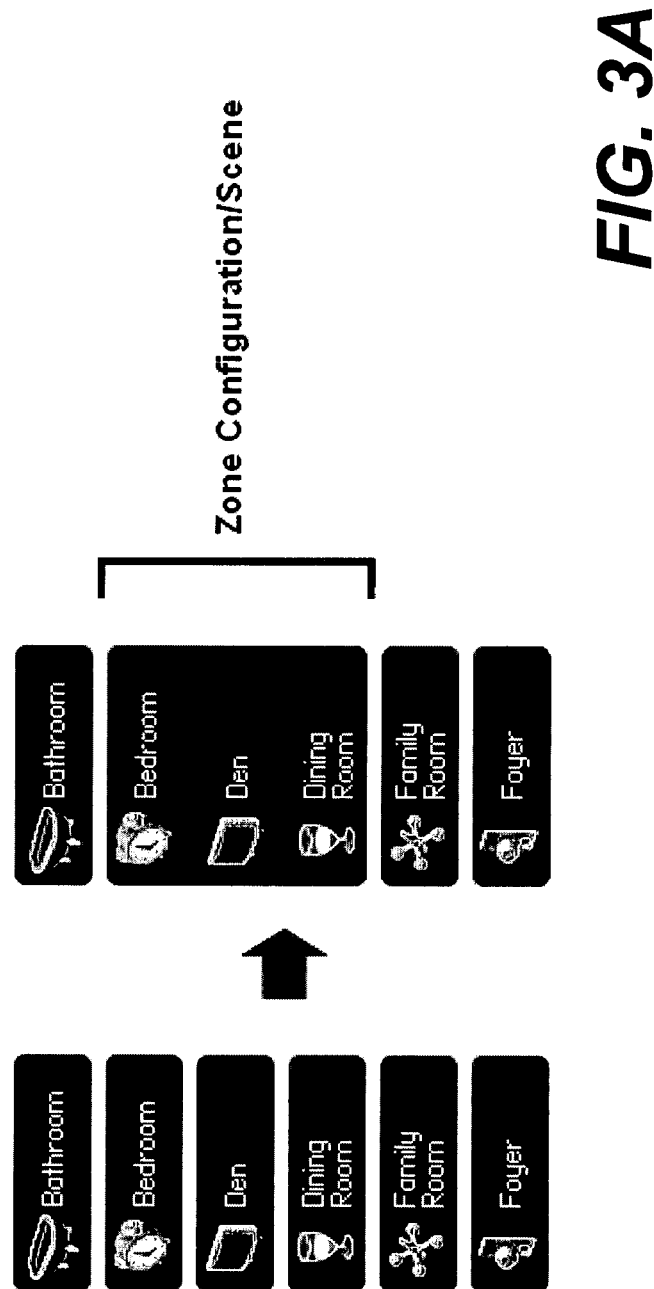


FIG. 2B

270

**FIG. 2C**



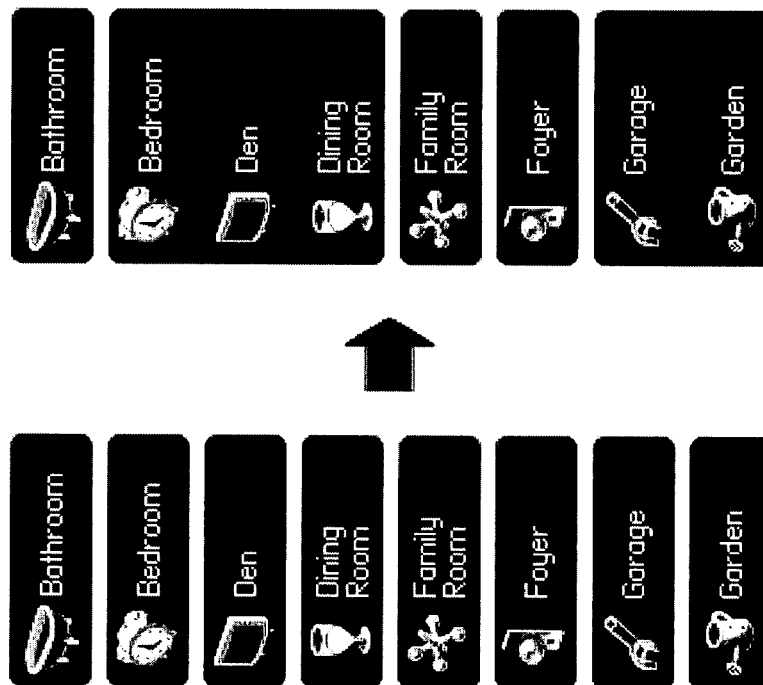
U.S. Patent

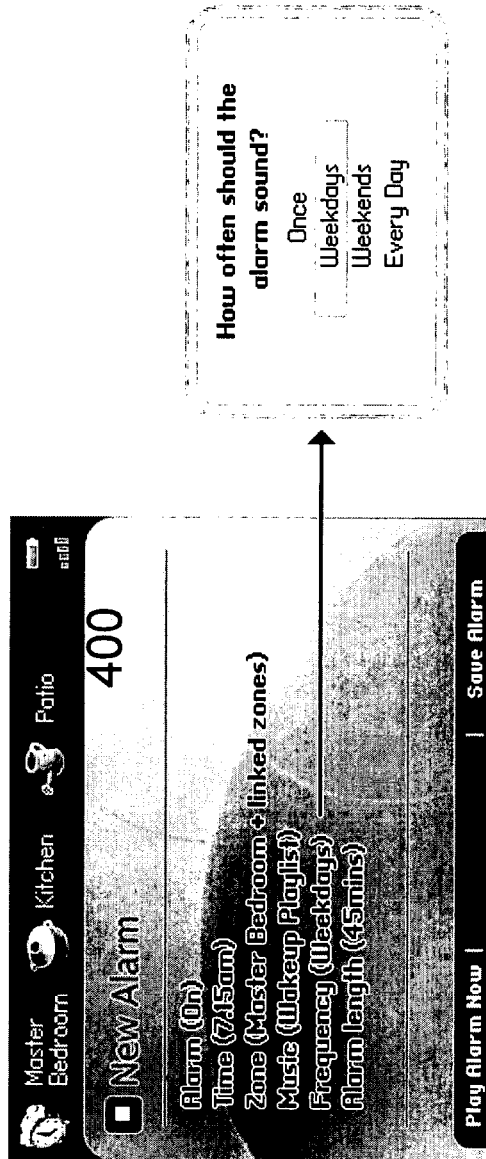
Nov. 24, 2020

Sheet 6 of 11

US 10,848,885 B2

FIG. 3B



**FIG. 4**

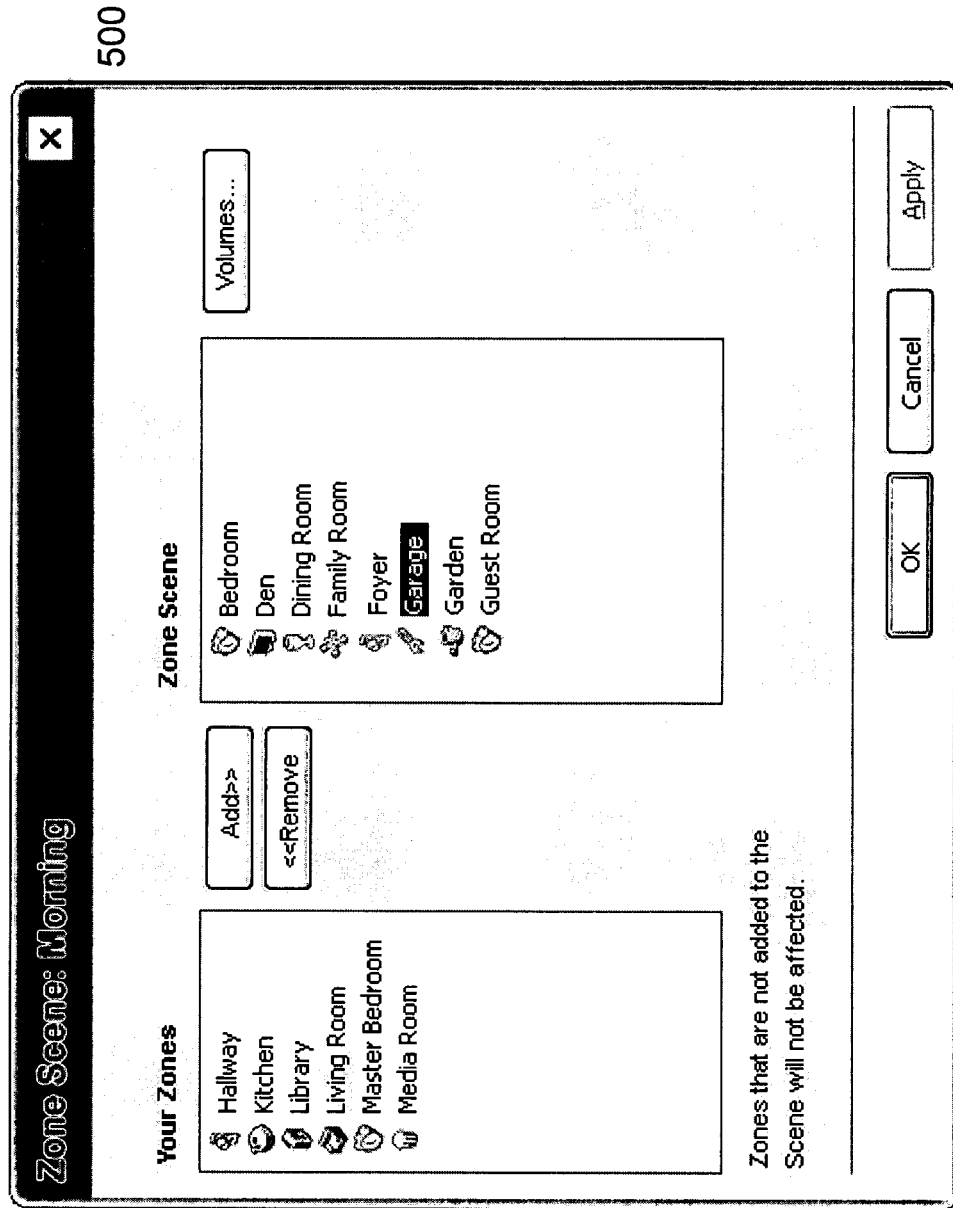


FIG. 5A

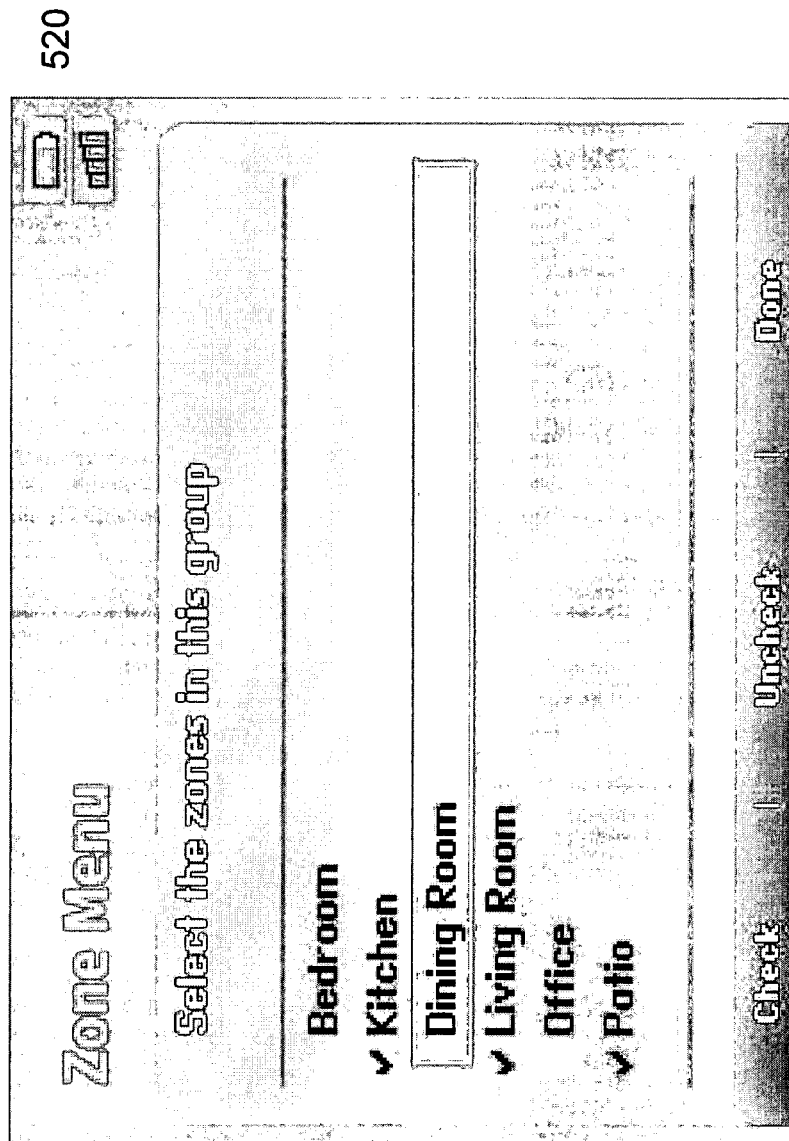


FIG. 5B

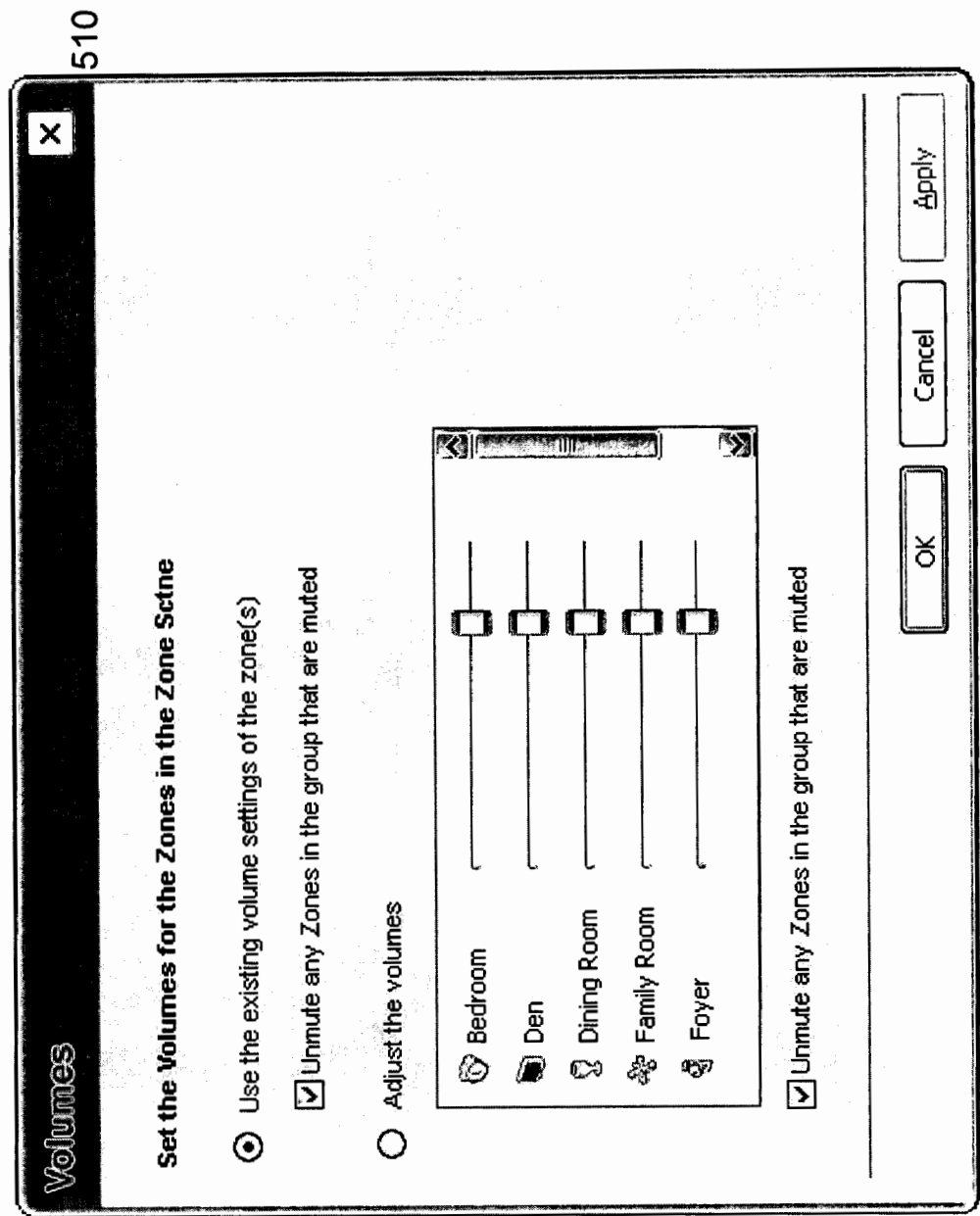
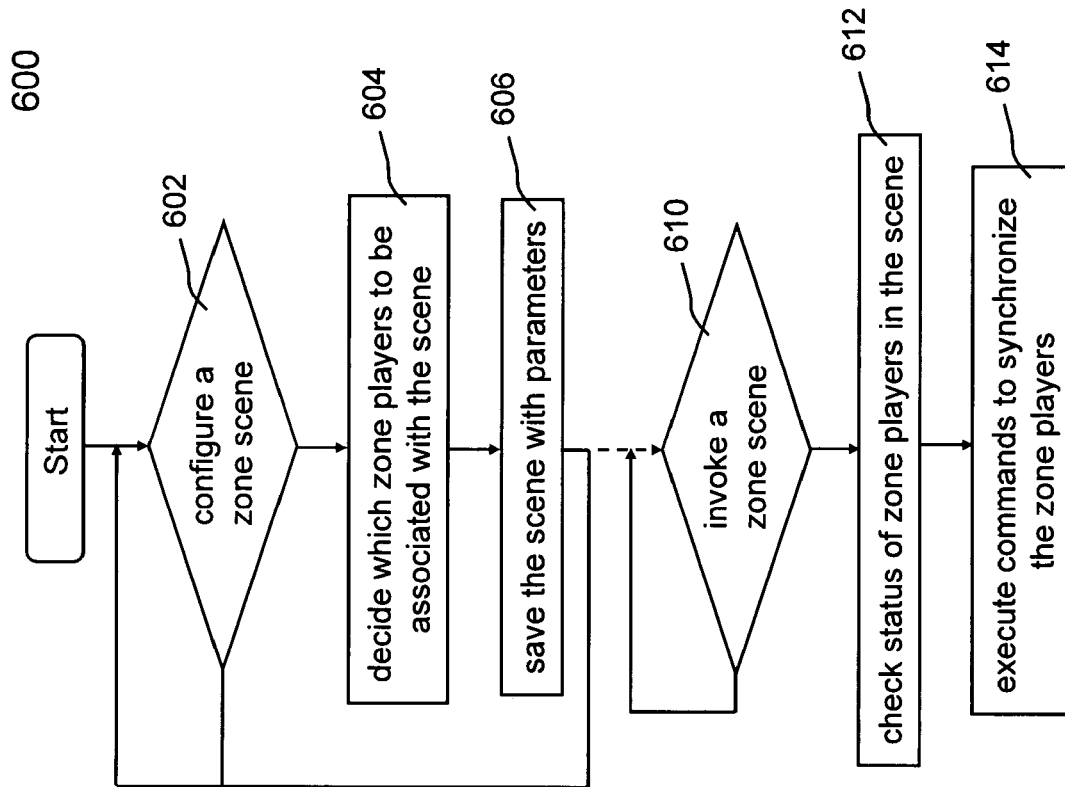


FIG. 5C

**FIG. 6**

US 10,848,885 B2

1

ZONE SCENE MANAGEMENT**CROSS REFERENCE TO RELATED APPLICATIONS**

This application is a continuation of and claims priority to U.S. patent application Ser. No. 15/130,919, filed on Apr. 15, 2016, entitled "ZONE SCENE ACTIVATION," which is a continuation of U.S. patent application Ser. No. 14/465,457, filed on Aug. 21, 2014, entitled "METHOD AND APPARATUS FOR UPDATING ZONE CONFIGURATIONS IN A MULTI-ZONE SYSTEM," which is a continuation of U.S. patent application Ser. No. 13/896,829, filed on May 17, 2013, entitled "METHOD AND APPARATUS FOR UPDATING ZONE CONFIGURATIONS IN A MULTI-ZONE SYSTEM," which is a continuation of U.S. patent application Ser. No. 11/853,790, filed Sep. 11, 2007, entitled "CONTROLLING AND MANIPULATING GROUPINGS IN A MULTI-ZONE MEDIA SYSTEM," which claims priority to U.S. Provisional Application No. 60/825,407 filed on Sep. 12, 2006, entitled "CONTROLLING AND MANIPULATING GROUPINGS IN A MULTI-ZONE MEDIA SYSTEM," each of which is hereby incorporated by reference in its entirety for all purposes.

BACKGROUND OF THE INVENTION**Field of the Invention**

The invention is generally related to the area of consumer electronics and human-computer interaction. In particular, the invention is related to method and apparatus for controlling or manipulating a plurality of multimedia players in a multi-zone system.

An enduring passion for quality audio reproduction or system is continuing to drive demands from users. One of the demands includes an audio system in a house in which, for example, one could grill to classic rock on a patio while another one may cook up his/her own music selections in a kitchen. This is all at the same time while a teenager catches a ballgame in a family room, and another one blasts pop in a bedroom. And the best part of such audio system is that each family member does not need his or her own stereo system—one system gives everyone access to all the music sources.

Currently, one of the systems that can meet part of such demand is a conventional multi-zone audio system that usually includes a number of audio players. Each of the audio players has its own amplifier(s) and a set of speakers and typically installed in one place (e.g., a room). In order to play an audio source at one location, the audio source must be provided locally or from a centralized location. When the audio source is provided locally, the multi-zone audio system functions as a collection of many stereo systems, making source sharing difficult. When the audio source is provided centrally, the centralized location may include a juke box, many compact discs, an AM or FM radio, tapes, or others. To send an audio source to an audio player demanding such source, a cross-bar type of device is used to prevent the audio source from going to other audio players that may be playing other audio sources.

In order to achieve playing different audio sources in different audio players, the traditional multi-zone audio system is generally either hard-wired or controlled by a pre-configured and pre-programmed controller. While the pre-programmed configuration may be satisfactory in one situation, it may not be suitable for another situation. For

2

example, a person would like to listen to broadcast news from his/her favorite radio station in a bedroom, a bathroom and a den while preparing to go to work in the morning. The same person may wish to listen in the den and the living room to music from a compact disc in the evening. In order to satisfy such requirements, two groups of audio players must be established. In the morning, the audio players in the bedroom, the bathroom and the den need to be grouped for the broadcast news. In the evening, the audio players in the den and the living room are grouped for the music. Over the weekend, the audio players in the den, the living room, and a kitchen are grouped for party music. Because the morning group, the evening group and the weekend group contain the den, it can be difficult for the traditional system to accommodate the requirement of dynamically managing the ad hoc creation and deletion of groups.

There is a need for dynamic control of the audio players as a group. With a minimum manipulation, the audio players may be readily grouped. In a traditional multi-zone audio system, the audio players have to be adjusted one at a time, resulting in an inconvenient and non-homogenous audio environment. Further, there is a need to individually or systematically adjust the audio volume of the audio players.

SUMMARY OF THE INVENTION

This section is for the purpose of summarizing some aspects of the present invention and to briefly introduce some preferred embodiments. Simplifications or omissions in this section as well as in the abstract or the title of this description may be made to avoid obscuring the purpose of this section, the abstract and the title. Such simplifications or omissions are not intended to limit the scope of the present invention.

In general, the present invention pertains to controlling a plurality of multimedia players, or simply players, in groups. According to one aspect of the present invention, a mechanism is provided to allow a user to group some of the players according to a theme or scene, where each of the players is located in a zone. When the scene is activated, the players in the scene react in a synchronized manner. For example, the players in the scene are all caused to play an audio source or music in a playlist, wherein the audio source may be located anywhere on a network.

According to another aspect of the present invention, the scene may be activated at any time or a specific time. A user may activate the scene at any time so that only some selected zones in an entertainment system facilitate a playback of an audio source. When the scene is activated at a specific time, the scene may be used as an alarm or buzzer.

According to still another aspect of the present invention, a controlling device (also referred to herein as controller) is provided to facilitate a user to select any of the players in the system to form respective groups each of which is set up per a scene. Although various scenes may be saved in any of the members in a group, commands are preferably sent from the controller to the rest of the members when one of the scenes is executed. Depending on implementation, the commands include parameters pertaining to identifiers of the players, volumes settings, audio source and etc.

According to yet another aspect of the present invention, a configurable module is implemented in the controlling device that provides interactive graphic user interface for forming, managing and controlling groups in the system, de-grouping a group or adjusting audio volume of individual players or a group of players.

US 10,848,885 B2

3

The present invention may be implemented in many forms including software, hardware or a combination of both. According to one embodiment, the present invention is directed to a method for groupings in a multi-zone media system, the method comprises providing a mechanism to allow a user to determine which players in the system to be associated with a theme representing a group; and configuring the theme with parameters pertaining to the players, wherein the theme is activated at anytime or a specific time so that the players react in a synchronized manner. The players in a scene are synchronized to play a multimedia file when the scene is activated.

According to another embodiment, the present invention is directed to an entertainment system for grouping players, the system comprises: a plurality of players, each located in one zone; and a controller providing a mechanism to allow a user to select which of the players to be associated with a theme representing a group; and configure the theme with parameters pertaining to the selected players, wherein the theme is activated at anytime or a specific time so that the selected players react in a synchronized manner. As a result, the selected players are synchronized to play a multimedia that is in a digital format and retrieved from a source over a network.

One of the objects, features, and advantages of the present invention is to remotely control a plurality of multimedia players in a multi-zone system, playing and controlling the audio source synchronously if the players are grouped together, or playing and controlling the audio source individually if the players are disassociated with each other.

Other objects, features, and advantages of the present invention will become apparent upon examining the following detailed description of an embodiment thereof, taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

FIG. 1 shows an exemplary configuration in which the present invention may be practiced;

FIG. 2A shows an exemplary functional block diagram of a player in accordance with the present invention;

FIG. 2B shows an example of a controller that may be used to remotely control one of more players of FIG. 2A;

FIG. 2C shows an exemplary internal functional block diagram of a controller in accordance with one embodiment of the present invention;

FIG. 3A provides an illustration of one zone scene, where the left column shows the starting zone grouping—all zones are separate, the column on the right shows the effects of grouping the zones to make a group of 3 zones named after “Morning”;

FIG. 3B shows that a user defines multiple groups to be gathered at the same time;

FIG. 4 shows an exemplary user interface that may be displayed on a controller or a computer of FIG. 1;

FIG. 5A shows a user interface to allow a user to form a scene;

FIG. 5B shows another user interface 520 to allow a user to form a scene;

FIG. 5C shows a user interface to allow a user to adjust a volume level of the zone players in a zone scene individually or collectively;

4

FIG. 6 shows a flowchart or process of providing a player theme or a zone scene for a plurality of players, where one or more of the players are placed in a zone; and

FIG. 7 shows an example user interface for invoking a zone scene; and

FIG. 8 shows another example user interface for invoking a zone scene.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The detailed description of the invention is presented largely in terms of procedures in terms of procedures, steps, logic blocks, processing, and other symbolic representations that directly or indirectly resemble the operations of data processing devices coupled to networks. These process descriptions and representations are typically used by those skilled in the art to most effectively convey the substance of their work to others skilled in the art. Numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will become obvious to those skilled in the art that the present invention may be practiced without these specific details. In other instances, well known methods, procedures, components, and circuitry have not been described in detail to avoid unnecessarily obscuring aspects of the present invention.

Reference herein to “one embodiment” or “an embodiment” means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one embodiment of the invention. The appearances of the phrase “in one embodiment” in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. Further, the order of blocks in process flowcharts or diagrams representing one or more embodiments of the invention do not inherently indicate any particular order nor imply any limitations in the invention.

Referring now to the drawings, in which like numerals refer to like parts throughout the several views. FIG. 1 shows an exemplary configuration 100 in which the present invention may be practiced. The configuration may represent, but not be limited to, a part of a residential home, a business building or a complex with multiple zones. There are a number of multimedia players of which three examples 102, 104 and 106 are shown as audio devices. Each of the audio devices may be installed or provided in one particular area or zone and hence referred to as a zone player herein.

As used herein, unless explicitly stated otherwise, an audio source or audio sources are in digital format and can be transported or streamed over a data network. To facilitate the understanding of the present invention, it is assumed that the configuration 100 represents a home. Thus, the zone player 102 and 104 may be located in two of the bedrooms respectively while the zone player 106 may be installed in a living room. All of the zone players 102, 104 and 106 are coupled directly or indirectly to a data network 108. In addition, a computing device 110 is shown to be coupled on the network 108. In reality, any other devices such as a home gateway device, a storage device, or an MP3 player may be coupled to the network 108 as well.

The network 108 may be a wired network, a wireless network or a combination of both. In one example, all devices including the zone players 102, 104 and 106 are coupled to the network 108 by wireless means based on an industry standard such as IEEE 802.11. In yet another example, all devices including the zone players 102, 104 and

US 10,848,885 B2

5

106 are part of a local area network that communicates with a wide area network (e.g., the Internet).

Many devices on the network **108** are configured to download and store audio sources. For example, the computing device **110** can download audio sources from the Internet and store the downloaded sources locally for sharing with other devices on the Internet or the network **108**. The computing device **110** or any of the zone players can also be configured to receive streaming audio. Shown as a stereo system, the device **112** is configured to receive an analog audio source (e.g., from broadcasting) or retrieve a digital audio source (e.g., from a compact disk). The analog audio sources can be converted to digital audio sources. In accordance with the present invention, the audio source may be shared among the devices on the network **108**.

Two or more zone players may be grouped together to form a new zone group. Any combinations of zone players and an existing zone group may be grouped together. In one instance, a new zone group is formed by adding one zone player to another zone player or an existing zone group.

Referring now to FIG. 2A, there is shown an exemplary functional block diagram of a zone player **200** in accordance with the present invention. The zone player **200** includes a network interface **202**, a processor **204**, a memory **206**, an audio processing circuit **210**, a module **212**, and optionally, an audio amplifier **214** that may be internal or external. The network interface **202** facilitates a data flow between a data network (i.e., the data network **108** of FIG. 1) and the zone player **200** and typically executes a special set of rules (i.e., a protocol) to send data back and forth. One of the common protocols used in the Internet is TCP/IP (Transmission Control Protocol/Internet Protocol). In general, a network interface manages the assembling of an audio source or file into smaller packets that are transmitted over the data network or reassembles received packets into the original source or file. In addition, the network interface **202** handles the address part of each packet so that it gets to the right destination or intercepts packets destined for the zone player **200**.

The network interface **202** may include one or both of a wireless interface **216** and a wired interface **217**. The wireless interface **216**, also referred to as a RF interface, provides network interface functions by a wireless means for the zone player **200** to communicate with other devices in accordance with a communication protocol (such as the wireless standard IEEE 802.11a, 802.11b or 802.11g). The wired interface **217** provides network interface functions by a wired means (e.g., an Ethernet cable). In one embodiment, a zone player includes both of the interfaces **216** and **217**, and other zone players include only a RF or wired interface. Thus these other zone players communicate with other devices on a network or retrieve audio sources via the zone player. The processor **204** is configured to control the operation of other parts in the zone player **200**. The memory **206** may be loaded with one or more software modules that can be executed by the processor **204** to achieve desired tasks. According to one aspect of the present invention, a software module implementing one embodiment of the present invention is executed, the processor **204** operates in accordance with the software module in reference to a saved zone group configuration characterizing a zone group created by a user, the zone player **200** is caused to retrieve an audio source from another zone player or a device on the network.

According to one embodiment of the present invention, the memory **206** is used to save one or more saved zone configuration files that may be retrieved for modification at

6

any time. Typically, a saved zone group configuration file is transmitted to a controller (e.g., the controlling device **140** or **142** of FIG. 1, a computer, a portable device, or a TV) when a user operates the controlling device. The zone group configuration provides an interactive user interface so that various manipulations or control of the zone players may be performed.

The audio processing circuit **210** resembles most of the circuitry in an audio playback device and includes one or more digital-to-analog converters (DAC), an audio preprocessing part, an audio enhancement part or a digital signal processor and others. In operation, when an audio source is retrieved via the network interface **202**, the audio source is processed in the audio processing circuit **210** to produce analog audio signals. The processed analog audio signals are then provided to the audio amplifier **214** for playback on speakers. In addition, the audio processing circuit **210** may include necessary circuitry to process analog signals as inputs to produce digital signals for sharing with other devices on a network.

Depending on an exact implementation, the module **212** may be implemented as a combination of hardware and software. In one embodiment, the module **212** is used to save a scene. The audio amplifier **214** is typically an analog circuit that powers the provided analog audio signals to drive one or more speakers.

Referring now to FIG. 2B, there is shown an exemplary controller **240**, which may correspond to the controlling device **140** or **142** of FIG. 1. The controller **240** may be used to facilitate the control of multi-media applications, automation and others in a complex. In particular, the controller **240** is configured to facilitate a selection of a plurality of audio sources available on the network, controlling operations of one or more zone players (e.g., the zone player **200**) through a RF interface corresponding to the RF interface **216** of FIG. 2A. According to one embodiment, the wireless means is based on an industry standard (e.g., infrared, radio, wireless standard IEEE 802.11a, 802.11b or 802.11g). When a particular audio source is being played in the zone player **200**, a picture, if there is any, associated with the audio source may be transmitted from the zone player **200** to the controller **240** for display. In one embodiment, the controller **240** is used to synchronize more than one zone players by grouping the zone players in a group. In another embodiment, the controller **240** is used to control the volume of each of the zone players in a zone group individually or together.

The user interface for the controller **240** includes a screen **242** (e.g., a LCD screen) and a set of functional buttons as follows: a "zones" button **244**, a "back" button **246**, a "music" button **248**, a scroll wheel **250**, "ok" button **252**, a set of transport control buttons **254**, a mute button **262**, a volume up/down button **264**, a set of soft buttons **266** corresponding to the labels **268** displayed on the screen **242**.

The screen **242** displays various screen menus in response to a user's selection. In one embodiment, the "zones" button **244** activates a zone management screen or "Zone Menu", which is described in more details below. The "back" button **246** may lead to different actions depending on the current screen. In one embodiment, the "back" button triggers the current screen display to go back to a previous one. In another embodiment, the "back" button negates the user's erroneous selection. The "music" button **248** activates a music menu, which allows the selection of an audio source (e.g., a song) to be added to a zone player's music queue for playback.

The scroll wheel **250** is used for selecting an item within a list, whenever a list is presented on the screen **242**. When the items in the list are too many to be accommodated in one screen display, a scroll indicator such as a scroll bar or a scroll arrow is displayed beside the list. When the scroll indicator is displayed, a user may rotate the scroll wheel **250** to either choose a displayed item or display a hidden item in the list. The “ok” button **252** is used to confirm the user selection on the screen **242**.

There are three transport buttons **254**, which are used to control the effect of the currently playing song. For example, the functions of the transport buttons may include play/pause and forward/rewind a song, move forward to a next song track, or move backward to a previous track. According to one embodiment, pressing one of the volume control buttons such as the mute button **262** or the volume up/down button **264** activates a volume panel. In addition, there are three soft buttons **266** that can be activated in accordance with the labels **268** on the screen **242**. It can be understood that, in a multi-zone system, there may be multiple audio sources being played respectively in more than one zone players. The music transport functions described herein shall apply selectively to one of the sources when a corresponding one of the zone players or zone groups is selected.

FIG. 2C illustrates an internal functional block diagram of an exemplary controller **270**, which may correspond to the controller **240** of FIG. 2B. The screen **272** on the controller **270** may be a LCD screen. The screen **272** communicates with and is commanded by a screen driver **274** that is controlled by a microcontroller (e.g., a processor) **276**. The memory **282** may be loaded with one or more application modules **284** that can be executed by the microcontroller **276** with or without a user input via the user interface **278** to achieve desired tasks. In one embodiment, an application module is configured to facilitate grouping a number of selected zone players into a zone group and synchronizing the zone players for one audio source. In another embodiment, an application module is configured to control together the audio volumes of the zone players in a zone group. In operation, when the microcontroller **276** executes one of the application modules **284**, the screen driver **274** generates control signals to drive the screen **272** to display an application specific user interface accordingly, more of which will be described below.

The controller **270** includes a network interface **280** referred to as a RF interface **280** that facilitates wireless communication with a zone player via a corresponding RF interface thereof. In one embodiment, the commands such as volume control and audio playback synchronization are sent via the RF interfaces. In another embodiment, a saved zone group configuration is transmitted between a zone player and a controller via the RF interfaces. The controller **270** may control one or more zone players, such as **102**, **104** and **106** of FIG. 1. Nevertheless, there may be more than one controllers, each preferably in a zone (e.g., a room) and configured to control any one and all of the zone players.

In one embodiment, a user creates a zone group including at least two zone players from the controller **240** that sends signals or data to one of the zone players. As all the zone players are coupled on a network, the received signals in one zone player can cause other zone players in the group to be synchronized so that all the zone players in the group playback an identical audio source or a list of identical audio sources in a timely synchronized manner. Similarly, when a user increases the audio volume of the group from the controller, the signals or data of increasing the audio volume

for the group are sent to one of the zone players and causes other zone players in the group to be increased together in volume and in scale.

According to one implementation, an application module is loaded in memory **282** for zone group management. When a predetermined key (e.g. the “zones” button **244**) is activated on the controller **240**, the application module is executed in the microcontroller **276**. The input interface **278** coupled to and controlled by the microcontroller **276** receives inputs from a user. A “Zone Menu” is then displayed on the screen **272**. The user may start grouping zone players into a zone group by activating a “Link Zones” or “Add Zone” soft button, or de-grouping a zone group by activating an “Unlink Zones” or “Drop Zone” button. The detail of the zone group manipulation will be further discussed below.

As described above, the input interface **278** includes a number of function buttons as well as a screen graphical user interface. It should be pointed out that the controller **240** in FIG. 2B is not the only controlling device that may practice the present invention. Other devices that provide the equivalent control functions (e.g., a computing device, a hand-held device) may also be configured to practice the present invention. In the above description, unless otherwise specifically described, it is clear that keys or buttons are generally referred to as either the physical buttons or soft buttons, enabling a user to enter a command or data.

One mechanism for ‘joining’ zone players together for music playback is to link a number of zone players together to form a group. To link a number of zone players together, a user may manually link each zone player or room one after the other. For example, there is a multi-zone system that includes the following zones.

- Bathroom
- Bedroom
- Den
- Dining Room
- Family Room
- Foyer

If the user wishes to link 5 of the 6 zone players using the current mechanism, he/she must start with a single zone and then manually link each zone to that zone. This mechanism may be sometimes quite time consuming. According to one embodiment, a set of zones can be dynamically linked together using one command. Using what is referred to herein as a theme or a zone scene, zones can be configured in a particular scene (e.g., morning, afternoon, or garden), where a predefined zone grouping and setting of attributes for the grouping are automatically effectuated.

For instance, a “Morning” zone scene/configuration command would link the Bedroom, Den and Dining Room together in one action. Without this single command, the user would need to manually and individually link each zone. FIG. 3A provides an illustration of one zone scene, where the left column shows the starting zone grouping—all zones are separate, the column on the right shows the effects of grouping the zones to make a group of 3 zones named after “Morning”.

Expanding this idea further, a Zone Scene can be set to create multiple sets of linked zones. For example, a scene creates 3 separate groups of zones, the downstairs zones would be linked together, the upstairs zones would be linked together in their own group, and the outside zones (in this case the patio) would move into a group of its own.

US 10,848,885 B2

9

In one embodiment as shown in FIG. 3B, a user defines multiple groups to be gathered at the same time. For example: an “Evening Scene” is desired to link the following zones:

Group 1
Bedroom
Den
Dining Room
Group 2
Garage
Garden

where Bathroom, Family Room and Foyer should be separated from any group if they were part of a group before the Zone Scene was invoked.

One important of the features, benefits and objects in the present invention is that that zones do not need to be separated before a zone scene is invoked. In one embodiment, a command is provided and links all zones in one step, if invoked. The command is in a form of a zone scene. After linking the appropriate zones, a zone scene command could apply the following attributes:

Set volumes levels in each zones (each zone can have a different volume)
Mute/Unmute zones.
Select and play specific music in the zones.
Set the play mode of the music (Shuffle, Repeat, Shuffle-repeat)
Set the music playback equalization of each zone (e.g., bass treble).

A further extension of this embodiment is to trigger a zone scene command as an alarm clock function. For instance the zone scene is set to apply at 8:00 am. It could link appropriate zones automatically, set specific music to play and then stop the music after a defined duration. Although a single zone may be assigned to an alarm, a scene set as an alarm clock provides a synchronized alarm, allowing any zones linked in the scene to play a predefined audio (e.g., a favorable song, a predefined playlist) at a specific time or for a specific duration. If, for any reason, the scheduled music failed to be played (e.g., an empty playlist, no connection to a share, failed UPnP, no Internet connection for an Internet Radio station), a backup buzzer will sound. This buzzer will be a sound file that is stored in a zone player.

FIG. 4 shows an exemplary user interface 400 that may be displayed on a controller 142 or a computer 110 of FIG. 1. The interface 400 shows a list of items that may be set up by a user to cause a scene to function at a specific time. In the embodiment shown in FIG. 4, the list of items includes “Alarm”, “Time”, “Zone”, “Music”, “Frequency” and “Alarm length”. “Alarm” can be set on or off. When “Alarm” is set on, “Time” is a specific time to set off the alarm. “Zone” shows which zone players are being set to play a specified audio at the specific time. “Music” shows what to be played when the specific time arrives. “Frequency” allows the user to define a frequency of the alarm. “Alarm length” defines how long the audio is to be played. It should be noted that the user interface 400 is provided herein to show some of the functions associated with setting up an alarm. Depending on an exact implementation, other functions, such as time zone, daylight savings, time synchronization, and time/date format for display may also be provided without departing from the present invention.

According to one embodiment, each zone player in a scene may be set up for different alarms. For example, a “Morning” scene includes three zone players, each in a bedroom, a den, and a dining room. After selecting the

10

scene, the user may set up an alarm for the scene as whole. As a result, each of the zone players will be activated at a specific time.

FIG. 5A shows a user interface 500 to allow a user to form a scene. The panel on the left shows the available zones in a household. The panel on the right shows the zones that have been selected and be grouped as part of this scene. Depending on an exact implementation of a user interface, Add/Remove buttons may be provided to move zones between the panels, or zones may be dragged along between panels.

FIG. 5B shows another user interface 520 to allow a user to form a scene. The user interface 520 that may be displayed on a controller or a computing device, lists available zones in a system. The list of zones in the user interface 520 includes ALL the zones in the system, including the zones that are already grouped. A checkbox is provide next to each of the zones so that a user may check in the zones to be associated with the scene.

FIG. 5C shows a user interface 510 to allow a user to adjust a volume level of the zone players in a zone scene individually or collectively. As shown in the user interface 510, the ‘Volumes . . .’ button (shown as sliders, other forms are possible) allows the user to affect the volumes of the associated zone players when a zone scene is invoked. In one embodiment, the zone players can be set to retain whatever volume that they currently have when the scene is invoked. Additionally the user can decide if the volumes should be unmuted or muted when the scene is invoked.

FIG. 6 shows a flowchart or process 600 of providing a player theme or a zone scene for a plurality of players, where one or more of the players are placed in a zone. The process 600 is presented in accordance with one embodiment of the present invention and may be implemented in a module to be located in the memory 282 of FIG. 2C.

The process 600 is initiated only when a user decides to proceed with a zone scene at 602. The process 600 then moves to 604 where it allows a user to decide which zone players to be associated with the scene. For example, there are ten players in a household, and the scene is named after “Morning”. The user may be given an interface to select four of the ten players to be associated with the scene. At 606, the scene is saved. The scene may be saved in any one of the members in the scene. In the example of FIG. 1, the scene is saved in one of the zone players and displayed on the controller 142. In operation, a set of data pertaining to the scene includes a plurality of parameters. In one embodiment, the parameters include, but may not be limited to, identifiers (e.g., IP address) of the associated players and a playlist. The parameters may also include volume/tone settings for the associated players in the scene. The user may go back to 602 to configure another scene if desired.

Given a saved scene, a user may activate the scene at any time or set up a timer to activate the scene at 610. The process 600 can continue when a saved scene is activated at 610. At 612, upon the activation of a saved scene, the process 600 checks the status of the players associated with the scene. The status of the players means that each of the players shall be in condition to react in a synchronized manner. In one embodiment, the interconnections of the players are checked to make sure that the players communicate among themselves and/or with a controller if there is such a controller in the scene.

It is assumed that all players associated with the scene are in good condition. At 614, commands are executed with the parameters (e.g., pertaining to a playlist and volumes). In one embodiment, data including the parameters is trans-

US 10,848,885 B2

11

ported from a member (e.g., a controller) to other members in the scene so that the players are caused to synchronize an operation configured in the scene. The operation may cause all players to play back a song in identical or different volumes or to play back a pre-stored file.

One of the features, benefits and advantages in the present invention is to allow sets of related devices (controllers and operating components) to exist as a group without interfering with other components that are potentially visible on the same wired or wireless network. Each of the sets is configured to a theme or a scene.

FIG. 7 shows an example user interface for invoking a zone scene. The user interface of FIG. 7 shows a Zone Menu that includes selectable indications of zone scenes.

FIG. 8 shows another example user interface for invoking a zone scene. FIG. 8 shows a Zone Menu that includes a softkey indicating a Scenes menu. Pressing the Scenes softkey will show the Scenes menu where all the available zone scenes are shown as selectable indications.

The present invention has been described in sufficient detail with a certain degree of particularity. It is understood to those skilled in the art that the present disclosure of embodiments has been made by way of examples only and that numerous changes in the arrangement and combination of parts may be resorted to without departing from the spirit and scope of the invention as claimed. While the embodiments discussed herein may appear to include some limitations as to the presentation of the information units, in terms of the format and arrangement, the invention has applicability well beyond such embodiment, which can be appreciated by those skilled in the art. Accordingly, the scope of the present invention is defined by the appended claims rather than the forgoing description of embodiments.

I claim:

1. A first zone player comprising:

a network interface that is configured to communicatively couple the first zone player to at least one data network; one or more processors;

a non-transitory computer-readable medium; and program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

while operating in a standalone mode in which the first zone player is configured to play back media individually in a networked media playback system comprising the first zone player and at least two other zone players:

(i) receiving, from a network device over a data network, a first indication that the first zone player has been added to a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked; and

(ii) receiving, from the network device over the data network, a second indication that the first zone player has been added to a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the second zone player is different than the third zone player;

12

after receiving the first and second indications, continuing to operate in the standalone mode until a given one of the first and second zone scenes has been selected for invocation;

after the given one of the first and second zone scenes has been selected for invocation, receiving, from the network device over the data network, an instruction to operate in accordance with a given one of the first and second zone scenes respectively comprising a given one of the first and second predefined groupings of zone players; and

based on the instruction, transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players such that the first zone player is configured to coordinate with at least one other zone player in the given one of the first and second predefined groupings of zone players over a data network in order to output media in synchrony with output of media by the at least one other zone player in the given one of the first and second predefined groupings of zone players.

2. The first zone player of claim 1, wherein the instruction to operate in accordance with the given one of the first and second zone scenes comprises an instruction to operate in accordance with the first zone scene, and

wherein transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players comprises transitioning from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to play back output media in synchrony with output of media by at least the second zone player.

3. The first zone player of claim 2, wherein the instruction is a first instruction, and wherein the first zone player further comprises program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

while operating in accordance with the first predefined grouping of zone players, receiving, from the network device over the data network, a second instruction to operate in accordance with the second predefined grouping of zone players; and

based on the second instruction, (a) ceasing to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) beginning to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

4. The first zone player of claim 2, wherein the first zone scene

further comprises an indication of predetermined media to be played when the first zone scene is invoked, and wherein the first zone player further comprises program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

US 10,848,885 B2

13

based on the instruction, coordinating with at least the second zone player to output the predetermined media in synchrony with output of the predetermined media with at least the second zone player.

5 5. The first zone player of claim 1, wherein the instruction to operate in accordance with the given one of the first and second zone scenes comprises an instruction to operate in accordance with the second zone scene, and wherein transition-
10 ing from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players comprises transition-
15 ing from operating in the standalone mode to operating in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

20 6. The first zone player of claim 5, wherein the instruction is a first instruction, and wherein the first zone player further comprises program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

25 while operating in accordance with the second predefined grouping of zone players, receiving, from the network device over the data network, a second instruction to operate in accordance with the first predefined grouping of zone players; and

30 based on the second instruction, (a) ceasing to operate in accordance with the second predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player and (b) begin-
35 ning to operate in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

40 7. The first zone player of claim 1, wherein the first predefined grouping of zone players does not include the third zone player, and wherein the second predefined grouping of zone players does not include the second zone player.

45 8. A non-transitory computer-readable medium, wherein the non-transitory computer-readable medium is provisioned with program instructions that, when executed by one or more processors, cause a first zone player to perform functions comprising:

50 while operating in a standalone mode in which the first zone player is configured to play back media individually in a networked media playback system comprising the first zone player and at least two other zone players:

55 (i) receiving, from a network device over a data network, a first indication that the first zone player has been added to a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked; and

60 (ii) receiving, from the network device over the data network, a second indication that the first zone player has been added to a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media

14

when the second zone scene is invoked, wherein the second zone player is different than the third zone player;

after receiving the first and second indications, continuing to operate in the standalone mode until a given one of the first and second zone scenes has been selected for invocation;

after the given one of the first and second zone scenes has been selected for invocation, receiving, from the network device over the data network, an instruction to operate in accordance with a given one of the first and second zone scenes respectively comprising a given one of the first and second predefined groupings of zone players; and

based on the instruction, transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players such that the first zone player is configured to coordinate with at least one other zone player in the given one of the first and second predefined groupings of zone players over a data network in order to output media in synchrony with output of media by the at least one other zone player in the given one of the first and second predefined groupings of zone players.

9. The non-transitory computer-readable medium of claim 8, wherein the instruction to operate in accordance with the given one of the first and second zone scenes comprises an instruction to operate in accordance with the first zone scene, and wherein transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players comprises transitioning from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

10. The non-transitory computer-readable medium of claim 9, wherein the instruction is a first instruction, and wherein the non-transitory computer-readable medium is also provisioned with program instructions that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

while operating in accordance with the first predefined grouping of zone players, receiving, from the network device over the data network, a second instruction to operate in accordance with the second predefined grouping of zone players; and

based on the second instruction, (a) ceasing to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) beginning to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

11. The non-transitory computer-readable medium of claim 9, wherein the first zone scene further comprises an indication of predetermined media to be played when the first zone scene is invoked, and wherein the non-transitory computer-readable medium is also provisioned with pro-

US 10,848,885 B2

15

gram instructions that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

based on the instruction, coordinating with at least the second zone player to output the predetermined media in synchrony with output of the predetermined media by at least the second zone player.

12. The non-transitory computer-readable medium of claim 8, wherein the instruction to operate in accordance with the given one of the first and second zone scenes comprises an instruction to operate in accordance with the second zone scene, and wherein transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players comprises transitioning from operating in the standalone mode to operating in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

13. The non-transitory computer-readable medium of claim 12, wherein the instruction is a first instruction, and wherein the non-transitory computer-readable medium is also provisioned with program instructions that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

while operating in accordance with the second predefined grouping of zone players, receiving, from the network device over the data network, a second instruction to operate in accordance with the first predefined grouping of zone players; and

based on the second instruction, (a) ceasing to operate in accordance with the second predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player and (b) beginning to operate in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

14. The non-transitory computer-readable medium of claim 8, wherein the first predefined grouping of zone players does not include the third zone player, and wherein the second predefined grouping of zone players does not include the second zone player.

15. A method executed by a first zone player, the method comprising:

while operating in a standalone mode in which the first zone player is configured to play back media individually in a networked media playback system comprising the first zone player and at least two other zone players:

(i) receiving, from a network device over a data network, a first indication that the first zone player has been added to a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked; and

(ii) receiving, from the network device over the data network, a second indication that the first zone player has been added to a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media

16

when the second zone scene is invoked, wherein the second zone player is different than the third zone player;

after receiving the first and second indications, continuing to operate in the standalone mode until a given one of the first and second zone scenes has been selected for invocation;

after the given one of the first and second zone scenes has been selected for invocation, receiving, from the network device over the data network, an instruction to operate in accordance with a given one of the first and second zone scenes respectively comprising a given one of the first and second predefined groupings of zone players; and

based on the instruction, transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players such that the first zone player is configured to coordinate with at least one other zone player in the given one of the first and second predefined groupings of zone players over a data network in order to output media in synchrony with output of media by the at least one other zone player in the given one of the first and second predefined groupings of zone players.

16. The method of claim 15, wherein the instruction to operate in accordance with the given one of the first and second zone scenes comprises an instruction to operate in accordance with the first zone scene, and wherein transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players comprises transitioning from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

17. The method of claim 16, wherein the instruction is a first instruction, the method further comprising:

while operating in accordance with the first predefined grouping of zone players, receiving, from the network device over the data network, a second instruction to operate in accordance with the second predefined grouping of zone players; and

based on the second instruction, (a) ceasing to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) beginning to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

18. The method of claim 16, wherein the first zone scene further comprises an indication of predetermined media to be played when the first zone scene is invoked, the method further comprising:

based on the instruction, coordinating with at least the second zone player to output the predetermined media in synchrony with output of the predetermined media by at least the second zone player.

19. The method of claim 15, wherein the instruction to operate in accordance with the given one of the first and second zone scenes comprises an instruction to operate in

US 10,848,885 B2

17

accordance with the second zone scene, and wherein transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players comprises transitioning from operating in the standalone mode to operating in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

20. The method of claim 19, wherein the instruction is a first instruction, the method further comprising:

while operating in accordance with the second predefined grouping of zone players, receiving, from the network device over the data network, a second instruction to operate in accordance with the first predefined grouping of zone players; and

based on the second instruction, (a) ceasing to operate in accordance with the second predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player and (b) beginning to operate in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

* * * * *

18

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 10,848,885 B2
APPLICATION NO. : 16/383561
DATED : November 24, 2020
INVENTOR(S) : Robert A. Lambourne

Page 1 of 3

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title Page

Delete "11 Drawing Sheets" and insert --13 Drawing Sheets--

In the Drawings

Following FIG. 6, insert FIG. 7 and FIG. 8 as shown on the attached drawing sheets

Signed and Sealed this
Eleventh Day of May, 2021



Drew Hirshfeld
*Performing the Functions and Duties of the
Under Secretary of Commerce for Intellectual Property and
Director of the United States Patent and Trademark Office*

CERTIFICATE OF CORRECTION (continued)

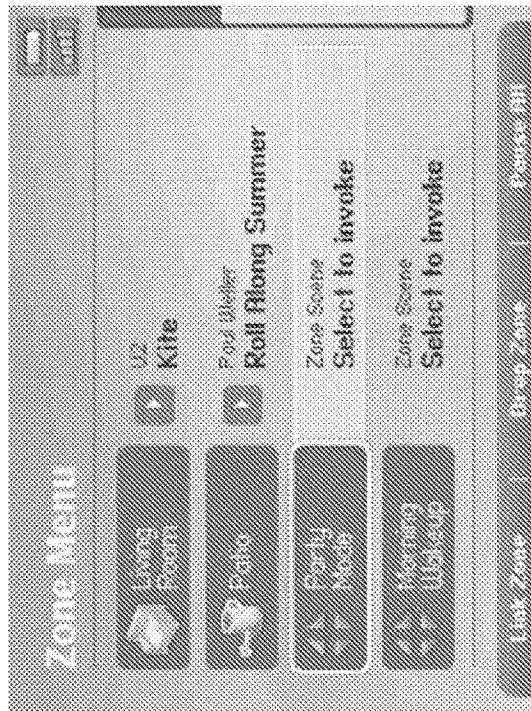
Page 2 of 3

U.S. Patent

Nov. 24, 2020

Sheet 12 of 13

10,848,885 B2



CERTIFICATE OF CORRECTION (continued)

Page 3 of 3

U.S. Patent

Nov. 24, 2020

Sheet 13 of 13

10,848,885 B2

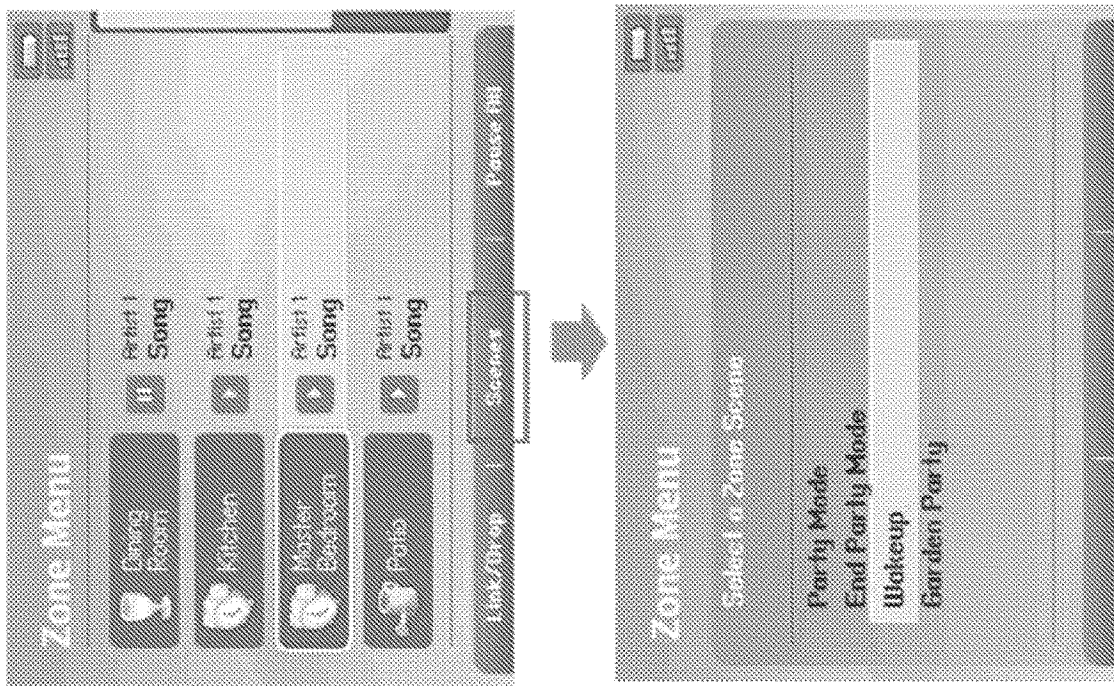


FIG. 8

CERTIFICATE OF COMPLIANCE

The brief complies with the type-volume limitation of Fed. Cir. R. 32(b)(1) because this brief contains 14,000 words, excluding the parts of the brief exempted by Fed. R. App. P. 32(f) and Fed. Cir. R. 32(b)(2).

This brief complies with the typeface requirements of Fed. R. App. P. 32(a)(5) and the type style requirements of Fed. R. App. P. 32(a)(6) because this brief has been prepared in a proportionally spaced typeface using Microsoft Word for Microsoft 365 in Century Schoolbook 14-point font.

ORRICK, HERRINGTON & SUTCLIFFE LLP

/s/ *E. Joshua Rosenkranz*

E. Joshua Rosenkranz

Counsel for Appellant